CBC (America) Corp.

Megapixel Cameras and MP100 Surveillance Video Server System Software

USER MANUAL

Rev 5.0.4
Dec. 27, 2007

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Chapter 1. Introduction

Product Overview

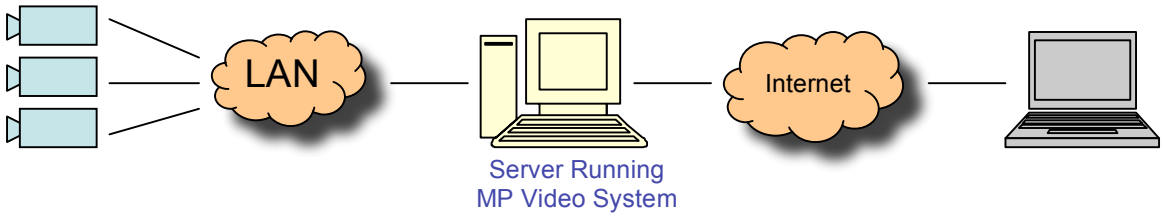
MP100 supports full-motion real-time multi-camera viewing and policy-based archiving, remote access to live and archived video via Internet Explorer, post-event zooming from digital archives, simultaneous viewing of full-field of view and multiple zoomed images and a multitude of other features that take advantage of unique functionality and performance of CBC (America) cameras.

To complement its line of Megapixel cameras, CBC (America) offers full-featured video surveillance software, MP100.

A typical system consists of a number of cameras connected over the local or wide area network to server PC running MP100 software. To achieve full motion archival rate, the server may be placed locally to the cameras so that the interconnecting LAN has sufficient bandwidth and small roundtrip delay between cameras and the server PC.

A remote PC can connect to the server PC over a slower network connection, such as Internet. Once connected, the remote PC can display live video stream and browse archives using Internet Explorer. Note that when connected to MP100 software, the remote PC does not connect to cameras directly, but rather to the server PC on which MP100 is running.

Figure 1. Typical System Configuration



Product contents

The Megapixel Camera system consists of the following:

- CBC (America) MP camera
- CD with NVR software

Inspect the package and contents for visible damage. If any components are damaged or missing, do not use the unit; contact the supplier immediately. If you need to return the unit, you must ship it in the original box.

System Requirements

We recommend a dedicated PC to receive the image streams from cameras for archiving and display. The suggested minimum computer requirements are detailed for standard and high performance installations.

Standard performance

24FPS at full resolution for MP2:

- OS: Windows XP Pro, Vista, Windows 2003 server, or Windows 2008 server
- CPU: Core 2 Duo 2Ghz
- RAM: 1 GB
- Video Card: NVIDIA, 128 MB RAM
- Network card: 100 base-T, 2 network cards – one for cameras and one for remote viewing

A PC with single, slower CPU is sufficient in the case when images are to be archived, but not displayed.
HDD size according to the desired capacity of the video archives (approximately 200Kbytes/image).
As an example, two 400GB drives will yield approximately 6 days of archiving capacity for an 8-camera system recording at 1 frame per second.

Network switch or router

Using a 100 Mbps network switch or router is recommended. Simple hubs do not provide collision management and are not suitable for multi-camera MP system.
Suggested models:
Power-over-Ethernet routers:

- Netgear ProSafe 8PT 100Base-TX Switch with PoE #FS108PNA, 10/100Base-TX w/4 PoE 100Base-TX, Street Price $120 (www.netgear.com).
- Netgear ProSafe 24+2 Gigabit Switch with POE #FS726TP, 2 Gigabit output w/12 PoE, 100Base-TX, Street Price $300 (www.netgear.com)
- Netgear ProSafe 24+4 Gigabit Switch with POE # FS728TP, 4 Gigabit output w/24 PoE, 100Base-TX, Street Price $400 (www.netgear.com)

- Netgear ProSafe 24 Gigabit Switch with POE # GS724TP, 24 Gigabit output w/24 PoE, 100Base-TX, Street Price $700 (www.netgear.com)
- D-Link Web Smart #DES-1316 (POE Switch/Hub) 10/100Base-TX, 8 PoE ports and 8 non-PoE ports,True IEEE 802.3af,Street price $388 (www.compuplus.com)
- TRENDnet #TPE-S88 (POE Switch/Hub) www.trendnet.com 10/100Base-TX 8 PoE ports and 8 non-PoE ports, True IEEE 802.3af, Street price $250(www.provantage.com)
- PowerDsine #PD-6001/AC (PoE Single port hub) www.powerdsine.com 10/100Base-TX, Single Midspan POE port, True IEEE 802.3af, Street price $29(www.provantage.com)

PoE network equipment must be CE marked for use in European Community.
Note that the cameras are designed for use with indoor network cabling only.

Recommended Accessories

We recommend the following accessories:

Monitors:

- Dell UltraSharp 2405FPW
  24-inch Wide Aspect Flat Panel LCD Monitor with Height Adjustable Stand
  (www.dell.com)
- Samsung's 243T, 24 Inch LCD Display (www.samsung.com)

MP3-DN requires a 3" window; all other cameras can use most any outdoor housing capable of accommodating the 3" width x 2-1/2" height, such as HWB-3 or GH-FWC24

Camera Reference

Introduction

MP1, MP2, MP2A, MP3, MP3-DN, MP5, MP5A, MP8D and MP8P are mega-pixel resolution IP cameras capable of delivering crisp, low-noise images at video frame rate.

MP1 is a 1.3-megapixel resolution camera having a maximum resolution of 1280 by 1024 and achieving a maximum frame rate of 30.

MP2 & MP2A are 2-megapixel resolution cameras having maximum resolution of 1600 by 1200 and achieving a maximum frame rate of 24. MP2A has a connector for an Auto iris lens.

MP3 is a 3-megapixel resolution camera. Its maximum resolution is 2048 by 1536. MP3 is typically viewed at 1920 by 1200 resolution with the frame rate up to 20.

MP3-DN is a dual-sensor, day-night camera featuring a 3-megapixel color sensor paired with a 1.3-megapixel monochrome sensor sensitive to near infrared illumination. When the scene is well-illuminated the 3-megapixel sensor is selected to deliver color images of up to 2048x1536 pixels. To provide seamless transition between day and night modes the color sensor is set to default resolution of 1920x1200 pixels. In low-light conditions MP3-DN can automatically switch to the 1.3-megapixel (1280x1024) monochrome sensor, enabling the delivery of clear imagery at illumination levels as low as 0.01 lux. MP3-DN typically delivers 20 FPS in day mode and over 30 FPS in night mode.

MP5 & MP5A are 5-megapixel resolution cameras. Their maximum resolution is 2592 by 1944. MP5 & MP5A are typically viewed at 2560 by 1600 resolution with the frame rate up to 15. MP5A has a connector for an Auto iris lens.

MP8D is a quad-sensor 8-megapixel panoramic camera consisting of four 2-megapixel sensors and operating at up to 22 FPS per channel. It is capable of providing 360 degree field of view.

MP8P is a quad-sensor 8-megapixel camera consisting of four 2-megapixel sensors and operating at up to 22 FPS per channel. It is capable of providing 180 degree field of view.

All cameras are equipped with LAN connector and can deliver image data at a maximum data rate of up to 55 Mbps. Images are sent over the network in a compressed Motion JPEG format using TFTP protocol.

All cameras feature:

- Automatic exposure (AE) and Gain (AGC) control
- Automatic backlight compensation
- Automatic multi-matrix white balance
- 50/60Hz selectable flicker control
- Electronic Zoom, Pan and Tilt (PTZ)
- Programmable brightness, saturation, gamma, sharpness, windowing and decimation
- Simultaneous delivery of full-field view and zoomed images at video frame rate
- Electronic image rotation by 180 degrees
- On board motion detection (except MP8D / MP8P: subject to change)
- Optional auto iris

Connectors

All MP cameras have the following connectors located on the rear panel of the camera housing:

- LAN connector, accepting a network UTP or STP cable carrying 100 Base-T. The LAN connector also accepts Power-over-Ethernet (PoE)
- Power terminals, accepting 12V-48V DC switching power supply or better
- Optionally, a DC auto-iris connector. MP3-DN does not support auto-iris and does not have this connector

Power

Power for all MP cameras can be supplied as follows:

- Via DC jack, 12V-48V. For power ratings see below. The center contact in the power connector is positive. A Switching type or better (inexpensive transformer types induce too much signal noise).
- Via LAN connector, 48V DC over spare wires or over data pairs. The cameras are compliant with IEEE 802.saf. The polarity is arbitrary. (For a list of recommended PoE switches, see "*Network Switch or Router*" on page 4)

Power consumption will vary depending on the mode of operation. The maximum power consumption takes place when the camera is polled at full frame rate and runs at full resolution. The maximum power consumption is 4 Watts for MP1,

MP2, & MP3; 4.5 Watts for MP3-DN; 5 Watts for MP5; 6 Watts for MP8D; and 8 Watts for MP8P.

Housing and Mounting

All MP camera models feature a durable aluminum housing that minimizes fire hazards. The housing is not hermetically sealed. The ambient temperature should be maintained between 0ºC and 50ºC (32ºF to 122ºF). The cameras are not to be used outdoors without appropriate protective enclosures.

Cameras are mounted using a ¼" x 20 threaded hole at the bottom of the housing. When mounting the camera make sure the screw that goes into the hole is short, ¼" or less, and does not touch the camera board.

The cameras are to be installed according to the applicable code. The mounting means should be adequate for mounting a 1 lb camera (except MP8D & MP8P that weights 4lbs)

Network Cabling

Category 5e cabling or better is recommended. All network cabling must be installed according to applicable codes and regulations.

Optics

All MP cameras should be used with a 1/2" or 2/3" optical format lenses. MP3-DN requires two manual iris lenses and has a limitation on lens diameter (<38mm). MP8D is supplied with 4 preinstalled high-quality lenses.

Manual Lenses

A wide variety of C/CS mount lenses with mega-pixel resolution may be used with MP cameras. Note that all C-mount lenses require a 5mm adaptor ring. Some lenses may also require 0.4mm-0.8mm adjustment spacers. CBC (America) lens suggestions include:

- Computar MLM-3XMP (3X macro zoom), format=2/3"
- Computar H0514-MP (5mm), format=1/2"
- Computar M0814-MP (8mm), format=2/3"
- Computar M1214-MP (12mm), format=2/3"
- Computar M1614-MP (16mm), format=2/3"
- Computar M2514-MP (25mm), format=2/3"
- Computar M5018-MP (50mm), format=2/3"
- Computar H2Z0414C-MP (4mm - 8mm), format=1/2"
- Computar H3Z4512-CS (4.5mm – 12.5mm), format=1/2"

- Computar M3Z1228C-MP (12mm - 36mm), format=2/3”

See http://computarganz.com/product_category.cfm?category_id=14 for more data.

Using Manual Iris Lenses

Choosing the lens correctly is very important for mega-pixel cameras. Poorly selected lenses may cause the image to appear blurry when the lens iris is fully open or closed too much. To deliver sharp mega-pixel resolution images, it is recommended to:

- Use mega-pixel-resolution lenses.
- Obtain best resolution and depth of focus by having the iris slightly closed.

When setting up the camera, direct the camera at the scene and try closing the iris by several F-stops. At some point the image will look it’s sharpest. Leave the iris closed at this value.

Auto-Iris Lenses

Standard DC auto-iris lenses can be used with MP1, MP2 and M5 cameras equipped with the auto-iris feature. CBC (America) recommends the following high-resolution optics:

- Computar HG2Z0414FC-MP 4mm-8mm, format=1/2”

Using Auto-Iris Lenses

MP1, MP2 and MP5 are available with DC auto-iris option. To use the DC auto-iris lens:

1) Attach the lens to the MP camera.
2) Plug in the lens cable into the connector on the back of the camera. Make sure that the lens cable is long enough. Many DC lenses are available with short and long cable options.

The camera will automatically detect the presence of an auto-iris DC lens and start using it. Auto-iris lens operation typically proceeds as follows:

- If illumination is sufficient, the camera will close the iris within half-a-minute.
- When the iris is closed, the image should become visibly sharper. As the iris is gradually closed the image brightness may fluctuate slightly.

Monitoring Iris Status with CBC America Video System

You can monitor the state of the iris in CBC America Video System “Settings” dialog. See “Operating CBC America Video System” for details.

Accessing MP Cameras

Cameras can be accessed and controlled by means of

- CBC America Video System software (MP100)
- User software utilizing CBC (America) MP camera SDK (Software Developer Kit)
- HTTP requests issued from IE Explorer or other applications

Supported Network Services

All MP cameras, namely MP1, MP2, MP3, MP3-DN, MP5, MP8D and MP8P, support TFTP and HTTP network protocols. TFTP protocol yields the highest frame rate. It is accessible to the user through manufacturer SDK which supports both Windows and Linux platforms. Interested users can contact CBC (America) Corp. to obtain access to the SDK. Current MP100 software is based on TFTP protocol. Future releases may add support for HTTP protocol as well. HTTP protocol delivers lower frame rates but allows direct access to the cameras through Internet Explorer or other HTTP-based application.

Chapter 2. Video Surveillance Software

Software installation

To install MP100 software:

1. Make sure your Windows XP/Vista account has administrative privileges.
2. Open "Control Panel\Add or Remove Programs", remove old versions of **CBC America Video System** software if any.
3. Run **Setup.exe** and follow the directions to complete the installation.
4. If using Windows Vista, users must navigate to installation directory, open "My Computer \ C Drive\Program Files\CBC America\LocalMachine (type choose Application).
   Right-click on this file named "LocalMachine.exe", choose "properties -> Compatibility -> Privilege Level" and enable the "Run this program as an administrator" option.

Setup process installs software and places a shortcut *CBC America* on the desktop and creates a group *CBC America* in the Start menu.

Configure Firewall

As you start MP applications, your PC may prompt you to permit access to the network. CBC America Video System includes two applications that need access to the network:

- AVInstaller.exe/CameraInstaller: the camera finding and installation program
- LocalMachine.exe: the viewing and archiving program

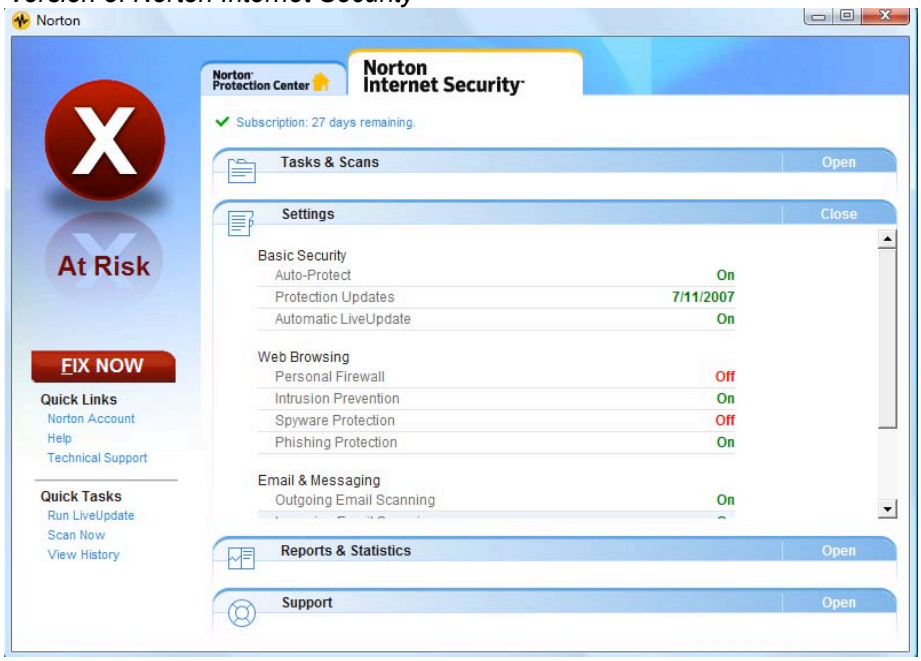
Both executables are located in the MP installation folder. You should grant access to these two applications when the firewall prompts you. For example:

For older version of Norton Internet Security (*Figure 2)*, select **Permit Always** and click **Ok.**

Figure 2. Older version of Norton Internet Security

For newer version of Norton Internet Security (*Figure 3)*, go to **Settings->Personal Firewall** (under **Web Browsing**) and select **Turn Off.**

Figure 3. Newer version of Norton Internet Security



For McAfee Personal Firewall (Figure 4), click **Grant Access**.

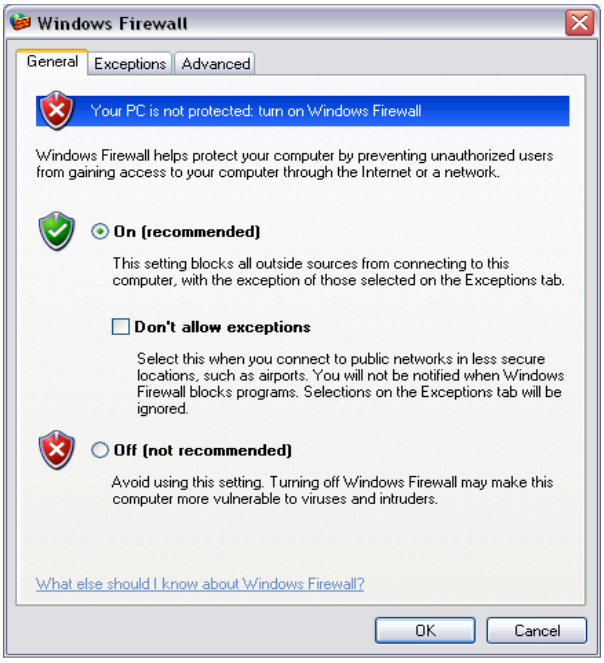
Figure 4. McAfee Personal Firewall Plus

McAfee Personal Firewall Plus
Application Has Been Modified
The application LocalMachine has changed since you first gave it access to the Internet. Do you still want to let it access the Internet?
Path: C:\Program Files\CBC America\LocalMachine.exe
McAfee...
Does not recognize this application.
Tell McAfee about this program.
I want to...
Grant Access
Block All Access

If you are using Windows XP firewall, follow these instructions:

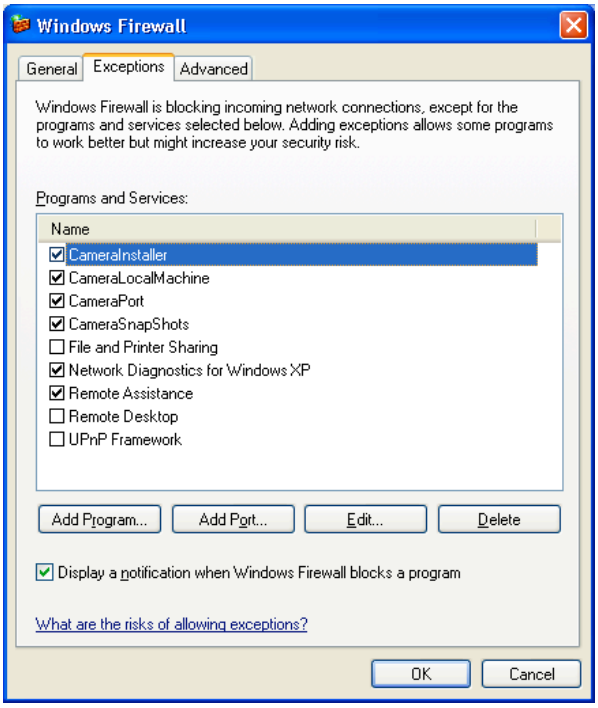
1. Click the Windows **Start** button and select **Control Panel**>**Windows firewall**.
2. *Windows Firewall* settings dialog will appear. If the firewall is *on*, make sure *Don't allow exceptions* is unchecked (*Figure 5*).

Figure 5. Windows Firewall General Tab


Windows Firewall
General
Exceptions
Advanced
Your PC is not protected: turn on Windows Firewall
Windows Firewall helps protect your computer by preventing unauthorized users from gaining access to your computer through the Internet or a network.
On (recommended)
This setting blocks all outside sources from connecting to this computer, with the exception of those selected on the Exceptions tab.
Don't allow exceptions
Select this when you connect to public networks in less secure locations, such as airports. You will not be notified when Windows Firewall blocks programs. Selections on the Exceptions tab will be ignored.
Off (not recommended)
Avoid using this setting. Turning off Windows Firewall may make this computer more vulnerable to viruses and intruders.
What else should I know about Windows Firewall?
OK
Cancel

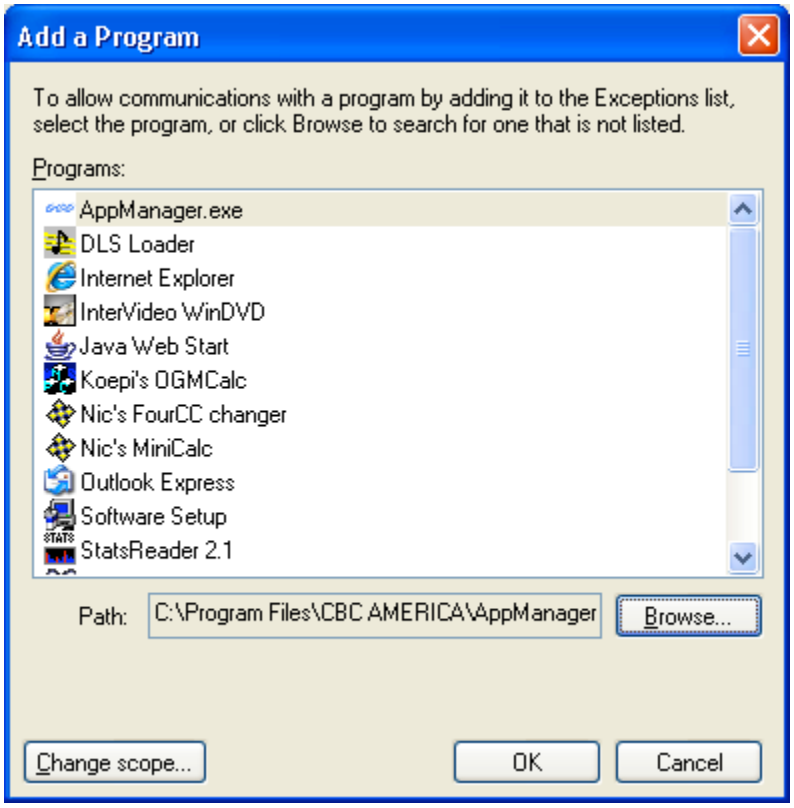
3. Click "Exceptions" tab. Make sure "AppManager", "CameraLocalMachine" and "CameraInstaller" appear in the list of programs and services and have a checkmark next to them (*Figure 6*). If these applications are not in the list, click **Add Program** button.

Figure 6. Exceptions Tab



4. Find “Camera Installer” in the list of programs and click **Ok**. Repeat same for “CBC America Video”.

Figure 7. Add a program

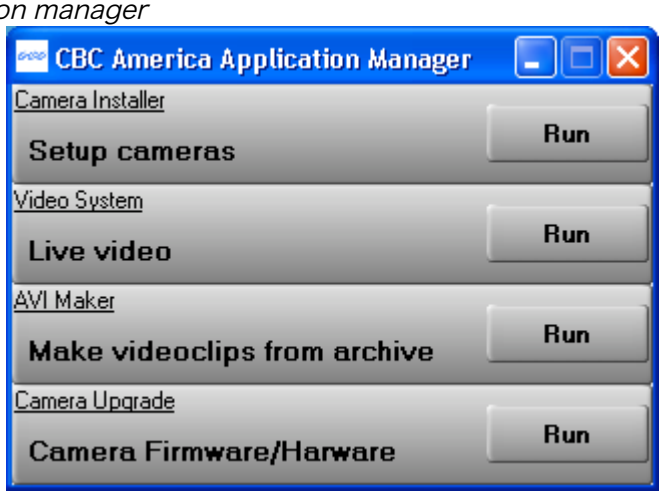


5. Click **Ok** to close the Windows Firewall dialog.

CBC Application Manager

Setup.exe places the shortcut to the CBC Application Manager on the user's Desktop. All programs and utilities comprising CBC America Video System can be accessed via CBC Application Manager. The standard selections include Camera Installer, Live Video System, and AVI Maker. The Firmware Loader can also be listed as shown below (*figure 8*) if the FirmwareLoader.exe is placed in "c:\Program Files**CBC America**" folder.

Figure 8. CBC Application manager



The CBC Application Manager standard selections include:

Camera Installer. Setup cameras (see *Camera Installer on page15)*

Video System. Watch live video (see *Operating CBC America Video System on page 19)*

AVI Maker. Make video clips from archive (see *AVI Maker on page 43)*

Firmware Loader. Upgrade cameras (see *Upgrading the cameras on page 45)*

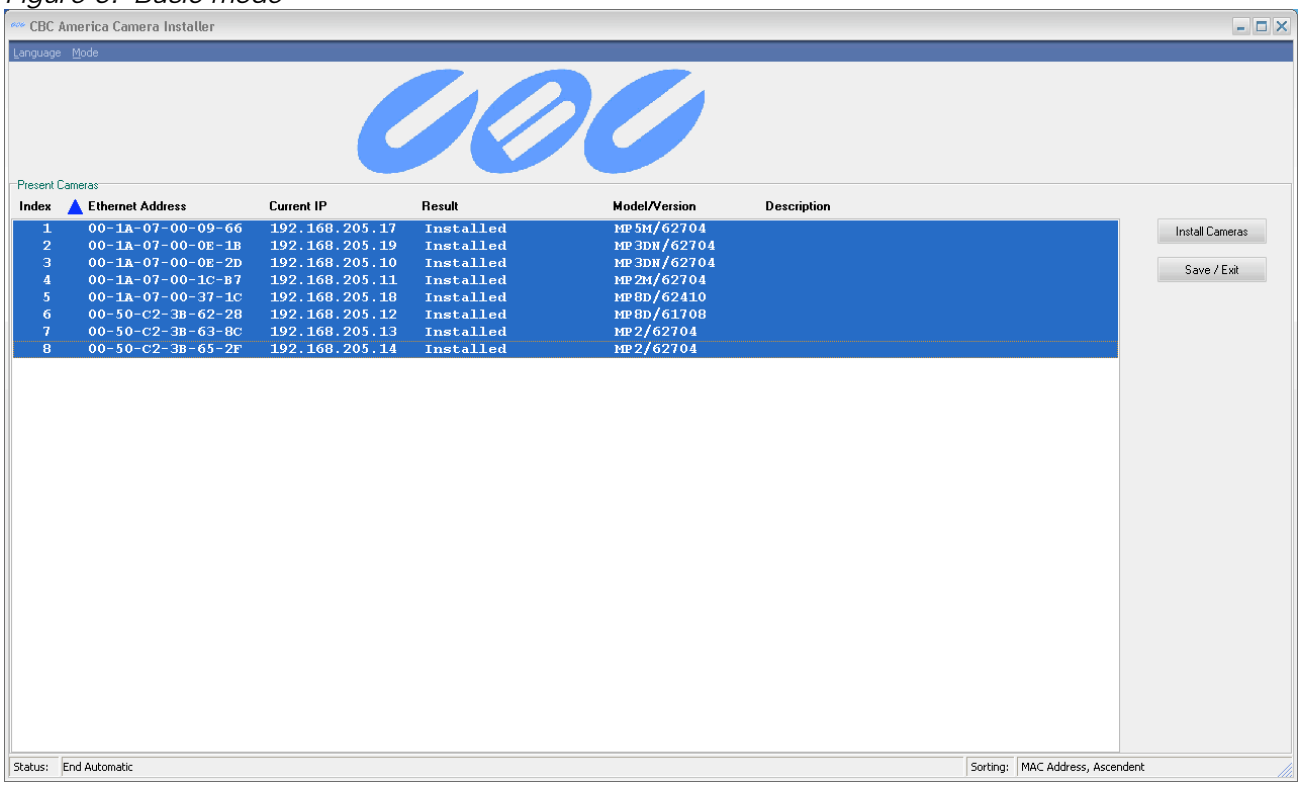
Camera Installer

Camera Installer allows you to find all MP cameras that are present on the local area network, assign IP addresses to detected cameras and to verify that the cameras are accessible and operational. Camera Installer saves information about installed cameras into an .ini file used by CBC America Video System. Camera Installer supports two modes of operation – Basic and Advanced.

Basic Mode

In this mode Camera Installer detects all MP cameras that can be reached by the broadcast request and automatically assigns IP addresses to the cameras, selecting those addresses that belong to the same sub-network as the computer running Camera Installer and that are not assigned to other devices. To detect and install the cameras automatically the user should simply press **Install Cameras** button. The installer will find, configure and verify the operability of the cameras and report installation results as shown below (*figure 9*). Users can sort the available cameras by MAC address or IP address, in ascendant or descendent order, by clicking on the appropriate title. Once the installation is completed, users should press **Save/Exit** button to save the installation information into a file ***LocalMachine.ini*** and export a plaintext list of cameras into a file ***CameraList.txt***

Figure 9. Basic mode

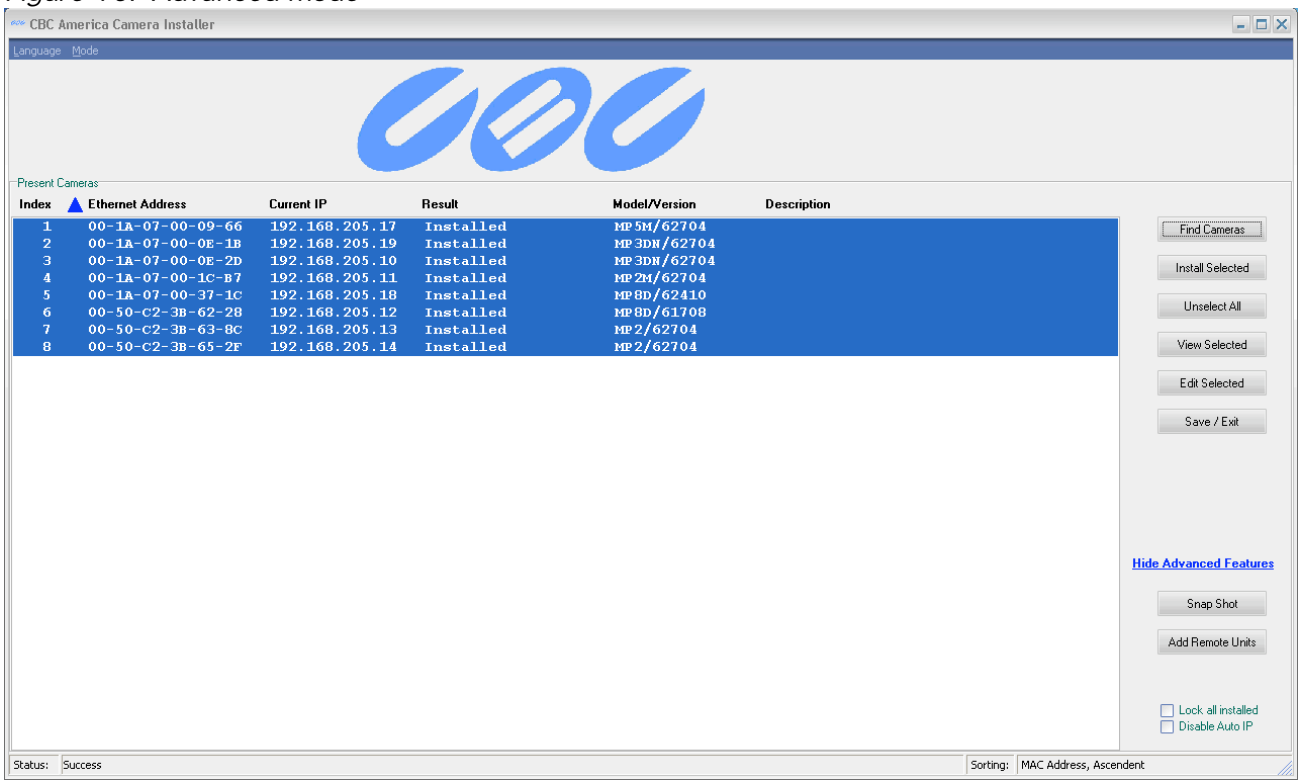

CBC America Camera Installer
Language Mode
Present Cameras
Index Ethernet Address Current IP Result Model/Version Description
1 00-1A-07-00-09-66 192.168.205.17 Installed MP5M/62704
2 00-1A-07-00-0E-1B 192.168.205.19 Installed MP3DN/62704
3 00-1A-07-00-0E-2D 192.168.205.10 Installed MP3DN/62704
4 00-1A-07-00-1C-B7 192.168.205.11 Installed MP2M/62704
5 00-1A-07-00-37-1C 192.168.205.18 Installed MP8D/62410
6 00-50-C2-3B-62-28 192.168.205.12 Installed MP8D/61708
7 00-50-C2-3B-63-8C 192.168.205.13 Installed MP2/62704
8 00-50-C2-3B-65-2F 192.168.205.14 Installed MP2/62704
Install Cameras
Save / Exit
Status: End Automatic
Sorting: MAC Address, Ascendent

Advanced Mode

In this mode the user can detect all MP cameras present on the local area network and choose one or more cameras to install. The installer has a mechanism to protect previously installed cameras (if any) from accidental changes. It also allows users to set IP address of the cameras either

automatically (as in Basic mode) or manually when specific range of IP addresses is required. Sorting feature is the same with that in Basic mode. (*Figure 10*)

Figure 10. Advanced mode



Advanced mode has an **Advanced Features** function group which is usually invisible. Users can click **Show Advanced Features** to make it visible and click again to hide it.

The "Advanced" mode provides the following set-up functions:

Find Cameras – this function searches for all MP cameras that are present on the local network and are accessible by the broadcast request. As a mechanism to protect any previously installed cameras from accidental change, it will also attempt to find cameras from "LocalMachine.ini" and set the default status of those cameras to "Installed, locked" so that further operations will not affect those cameras. At the completion of this operation the Installer will show all detected cameras.

TIP: Users are able to lock/unlock any previously installed cameras using the functions in the **Advanced Features** group. This group is hidden by default, but users can click *Show* **Advanced Features** to make advanced features visible.

Install Selected – this function installs the selected cameras and verifies their operation in a way similar to the **Install Cameras** function in Basic mode. When one or more cameras are selected (highlighted), the selected cameras will be installed and the unselected ones will be skipped. When no cameras are selected (highlighted), the Installer will install all cameras available.
TIP: All cameras marked as "Installed, locked" will be skipped in order to protect previous installations from accidental changes. To change the status of those cameras, please refer to the **Find Cameras** section.

Unselect All – Deselect all cameras.

View Selected – Open a web-browser to view the selected camera's HTTP interface where users can watch the live video and configure the camera.
TIP: Double-click the selected camera in "Result" or "Model/Version" section has the same effect.

Edit Selected – Open an **Advanced** dialog to edit the selected camera's IP address and/or add a camera specific description to the selected camera.
TIP: Double-click the selected camera in **IP address** or **Description** section has the same effect.

Add Remote Units – Open an **Advanced** dialog to add a camera manually. This feature is designed for application scenarios where the camera to be installed is on another sub-net that is not reachable by broadcasting. Users should use this feature only if the camera's MAC and IP addresses are known and the connectivity has been verified.

Save/ Exit – Save the information of the installed cameras into a file "LocalMachine.ini" for CBC America Video System and export a plaintext list of cameras into a file "CameraList.txt" for third party software, then exit the Installer.

Operating CBC America Video System MP100

Note: CBC America Video System requires a license file for each of the installed MP cameras.
The license is tied to a unique camera's MAC address. The license files are located in the C:\Program Files\CBC America\license folder. However, for the evaluation purposes, MP100 will operate any one MP camera without a license.
After the cameras are successfully installed, the CBC America Video System can be activated by clicking on the corresponding **Run** button in the CBC Application Manager.
The CBC (America) welcome screen will appear and hide automatically. The CBC America Video System software will start on its own after a few seconds. Shown below (*Figure 11*) is the CBC America Video System displaying live video from sixteen MP cameras. If **Hide** is selected, the application will be placed onto the system tray of the Windows task bar.

Figure 11. Live video display

Toolbar

The toolbar of the CBC America Video System is located in the upper portion of the screen above the video display area. It contains the following icons:

Turns on/off a drop-down list of the installed cameras. Individual cameras are disabled / enabled by left double-clicking on the camera number. When disabled, live video image from the disabled camera is replaced with a blue rectangle, and the camera number in the drop-down list is marked with a red cross.

Displays the Settings menu (see Setting below).

Enables a full screen display without the toolbar and menus.

Selects screen layout for viewing live/archived video from multiple cameras (from left to right): single camera layout, 2x2 camera layout; 3x3 camera layout; 4x4 camera layout; 10-camera layout with 2 large and 4x2 smaller images; 8-camera layout with 1 large, 3x1 and 1x4 smaller images; 13-camera layout with 1 large, 2x2 and 4x2 smaller images, 8-camera layout with 2x4 images for panoramic cameras, 10-camera layout with 2 large and 2x4 smaller images for regular and panoramic cameras. Depending on the chosen screen layout and the actual number of the installed cameras, the unused sections of the layout will be filled with a watermark image of the CBC (America) camera.

Displays the Archive controls (see Browsing Archives below).

Takes a snapshot of live video or an archive. The snapshot is taken from the camera which is highlighted in the drop-down list of the installed cameras (see above). To highlight another camera, left-click on the camera number. To take the snapshot from all cameras, highlight "cameras" at the root (top) of the drop-down camera list. The snapshot file names contain the camera number, date and time of the snapshot. To locate/view the snapshots in the snapshot folder, right-click anywhere on screen, then select "photo", "browse". Alternatively, snapshots can be taken by right-clicking on the live video image, and then selecting "photo", "save". The directory path to the snapshot folder is specified in the Settings menu (see Settings), or using the Right-Click menu under "Save To" (see Right-Click menu). By default, this is the directory My Documents\My Pictures\CBC America Photos\.

Reports the current CPU usage and network usage. The first two LED bars show the CPU usage and total network usage in per cent, respectively. The rest of LED bars show the network usage of each camera. The shown values are relatively to the camera which uses the most bandwidth.

Selecting Full / Reduced Resolution and Zoom

In order to fit multiple video images on screen the images are displayed at a reduced resolution. The format of the reduced resolution display is determined by the chosen screen layout (see Toolbar above on *page 20*).

An individual camera image can be expanded to a full resolution display by left double-clicking on the image. The full resolution image can be scaled back to its reduced resolution display by left double-clicking on the image. Image resolution (in pixels) is displayed in the upper left corner of the image.
An alternative mode of viewing the high resolution content is the zoom window (see screen snapshot below, *figure 12*).

Figure 12. Zoom window of screen snapshot

To zoom-in on an area of interest, draw a rectangle with the mouse (by left-clicking and holding down the mouse button). A separate zoom window will open up showing live video of the selected area at a full resolution. A green outline of the selected area will appear in the underlying reduced resolution image. Zooming in and out is performed by pressing Page Up and Page Down on the keyboard, or alternatively by rotating the mouse wheel (if available). Panning of the zoomed area is performed by dragging the green outline across the underlying camera image with the mouse (by left-clicking within the outline and holding down the mouse button), or alternatively with the keyboard arrow keys.

A maximum of four independent live zoom windows can be opened per each camera. Each zoom window will display live video at full resolution.

Note: the panoramic camera MP8D currently allows only one zoom window per channel.

Settings

Settings menu (*Figure 13*) is displayed by clicking on the Settings button in the toolbar.

Figure 13. Setting menu

Settings menu is the top level menu for all settings provided in the CBC America Video System. Selecting one of the menu items opens up a lower level drop-down menu containing detailed settings and options. Depending on the camera model, some of the listed groups of settings may become unavailable (for example, Day/Night settings are available only for the MP3-DN camera).

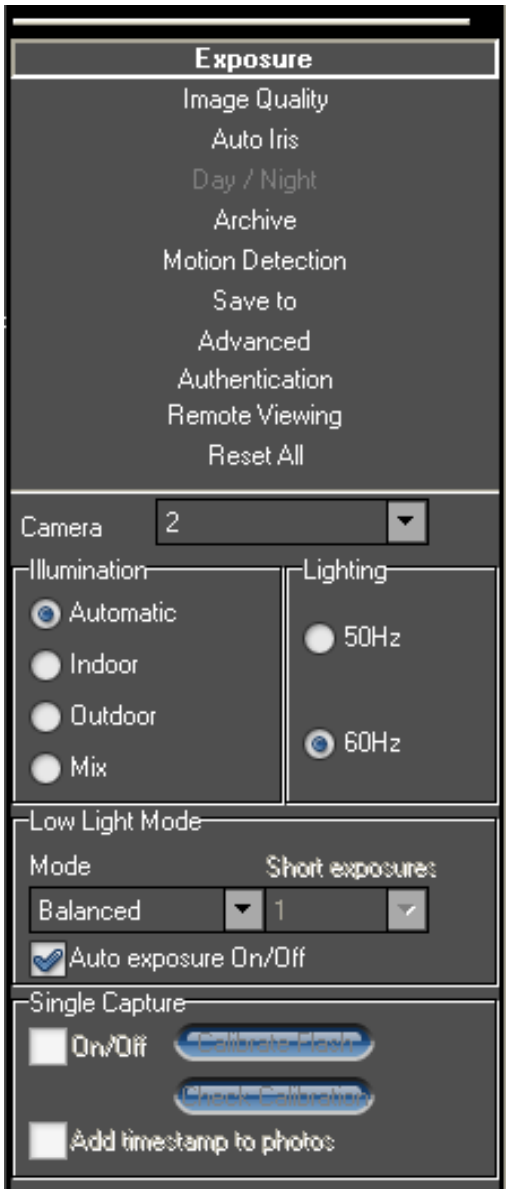
Note: selecting "**Reset all**" restores default settings of all available cameras.

The lower level menus contain a "Camera" field that displays the camera number which the settings are applied to (*Figure 14*). The "Camera" field can be expanded to a drop-down list of all installed cameras to select from. The list includes an "All cameras" option to apply settings to all cameras.

Figure 14. Display the camera number

Exposure

Figure 15. Exposure menu



Select **Exposure** (*Figure 15*) from the *Setting* menu to adjust exposure related settings:

- **Illumination** is a group of options to adjust camera's white balance computation to the illumination of the scene. "Automatic" enables the camera to adjust for illumination automatically.

- **Lighting** is a group of options to adjust camera's auto exposure computation to the oscillation frequency of the indoor lighting: European (50 Hz) or US/Japan (60 Hz).

- **Low Light Mode** is a group of options to adjust camera's operation under low light conditions:
  a. *High Speed* enables the shortest exposure time, selectable from a drop-down list "Short Exposure" between 1 and 10 ms, and the maximum frame rate. This option will reduce motion blur, but may result in a noisier video due to a high gain under low light conditions.
  b. *Speed* enables short exposure time not exceeding 10 ms by raising video gain as much as possible unless the low light conditions require a further time increase (up to 80 ms).
  c. *Balanced* enables medium-duration exposures up to 20 ms by raising video gain as much as possible unless the low light conditions require a further time increase (up to 80 ms).
  d. *Quality* enables longer exposures up to 40 ms, by raising video gain as much as possible unless the low light conditions require a further time increase (up to 200 ms). Motion blur may become high, but video will contain less noise under low light conditions.
  e. *Moon Light* enables very long exposures up to 500 ms if necessary.

- **Auto exposure On/Off** is an option to enable/disable the on-camera automatic exposure computation. Auto exposure maintains the target image brightness under changing lighting conditions.

- **Single Capture** – please go to the "Single Capture" section of this manual. (*page 26*)

Single Capture

Single Capture is a newly introduced work mode available on MP cameras of model MP1, MP2, and MP5. This work mode is designed for application scenarios where a single image is to be captured when an external event triggers the camera's auxiliary input. Possible application areas include license plate capturing, door control systems, photo booths, etc.

When single capture is activated, the camera stops sending live video and enters an endless loop to check external trigger events. The software that communicates with the camera must send image requests constantly and check whether the camera's responses contain images. When there is no event, the camera responds to image requests with an empty data packet. When an event occurs, the camera responds to the most recent image request with the captured image.

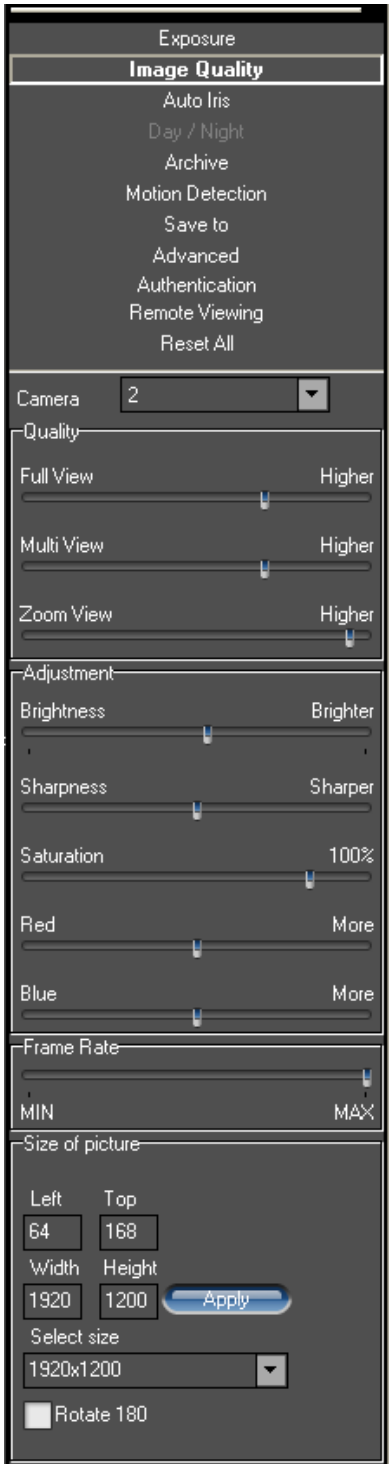
Single capture function is primarily designed for low-light applications where an external flash is needed. When there is enough light, the camera automatically switches to a regular High Speed mode with short exposure time, about 1 ~ 2 ms, without triggering the flash.

To use the single capture function properly, the camera must be physically connected to an external trigger source (as input) and a flash (as output). Then the camera should go through a calibration process to set up a working environment. In MP100 software, under "**Exposure \ Single Capture**" function group, there is a button "**Calibrate Flash**" to initiate the calibration. The calibration process takes about 13 seconds, during which period the flash will be triggered 13 times. Once the calibration is done, users should check the result of calibration by clicking the "**Check Calibration**" button. On clicking the button, the software reports an integer resulting from the calibration. If the number is within 768 ~ 6144, the calibration is successful, otherwise the calibration fails. For better image quality, one would expect the number to fall within 2000~3000 range. This number is under influence of the status of the iris. Closing the iris will cause the number to increase, and vice versa. Users may go through the calibration->adjusting iris->recalibration cycle for several times until the calibration result is satisfactory.

Once the calibration is done, the camera is ready to handle trigger events. During normal operation, there will be no live video displayed. In case of trigger events, MP100 software receives the captured images and stores it in the "**photo**" folder. On the menu there is a checkmark "**Add timestamp to photos**". When it is checked, the stored images will be marked with timestamp and user information. When MP100 software restarts, it automatically searches the "**photo**" folder for a file named "**userinfo.txt**" which stores user defined information for a specific camera. Users can edit this file so that user-specific information can be added to the captured images.

Image Quality

Figure 16. Image Quality menu



Select **Image Quality** from the Setting menu. **Image Quality** is a lower-level menu to adjust image quality settings:

Compression adjusts the level of JPEG compression applied to the images in different display modes:

"Full View" is to display full resolution video.

"Multi View" is to display multiple cameras at a reduced resolution.

"Zoom View" is to display zoom windows.

Brightness adjusts image brightness.

Sharpness adjusts image sharpness.

Saturation adjusts image color saturation.

Red adjusts the red tint. This setting changes the target for camera's automatic white balance computation. The effect is gradual: it takes 20-30 seconds for the camera to fully adjust to the new setting.

Blue adjusts the blue tint. This setting changes the target for camera's automatic white balance computation. The effect is gradual: it takes 20-30 seconds for the camera to fully adjust to the new setting.

Speed adjusts the rate at which the computer requests images from the camera. The maximum rate is limited by the camera, (different for different camera models).

Size of Picture adjusts starting coordinates and the image size.

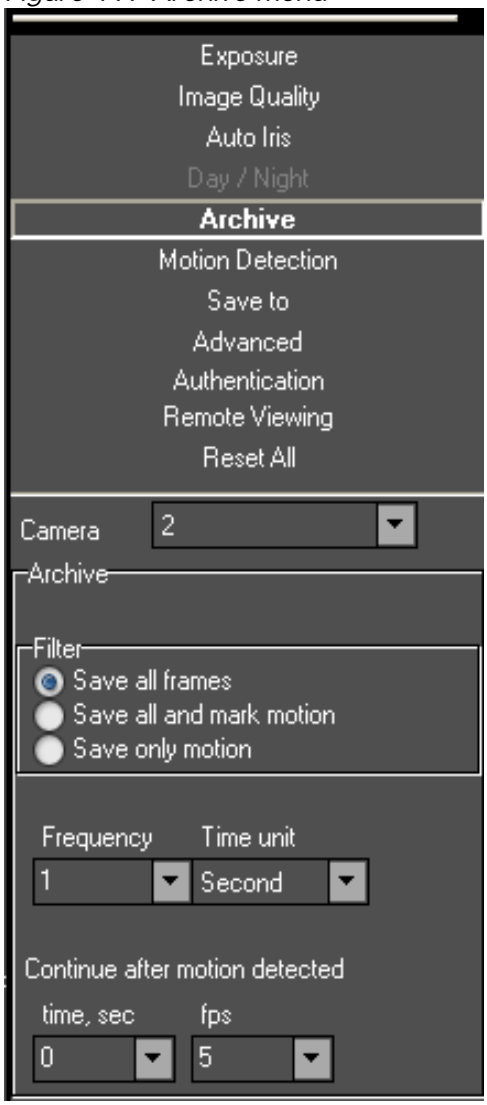
Note: affected by "*Don't update sensor window*" in Advanced settings.

Rotate 180 is an option for flipping the image vertically and horizontally such that it is rotated 180 degrees.

Archive

Select **Archive** (*Figure 17)* from the *Setting* menu. **Archive** is a lower-level menu to set up video archival settings:

Figure 17. Archive menu



Filter is a group of archiving options:

- *Save all frames* enables archiving the entire video stream received from the camera.
- *Save all and mark motion* enables saving the entire video stream and marking the frames when motion was detected for future archive browsing.
- *Save only motion* enables archiving only when motion was detected by the on-camera motion detector, and disables it in the absence of motion after a period of time specified under *Continue after motion detected*.

- **Frequency** is a drop-down list of options for archive recording rate. The "Off" option disables the archive recording. The "Max" option sets the archive frequency limited only by the camera and the network (different for different camera models).

Continue after motion detected is a drop-down list of options for the duration of archiving after the motion was last detected by the on-camera motion detector, and the frame rate at which such recording is done.

Note: if new motion is detected during such after-motion recording, the rate of recording will revert to the one specified under "Frequency".

Motion Detection

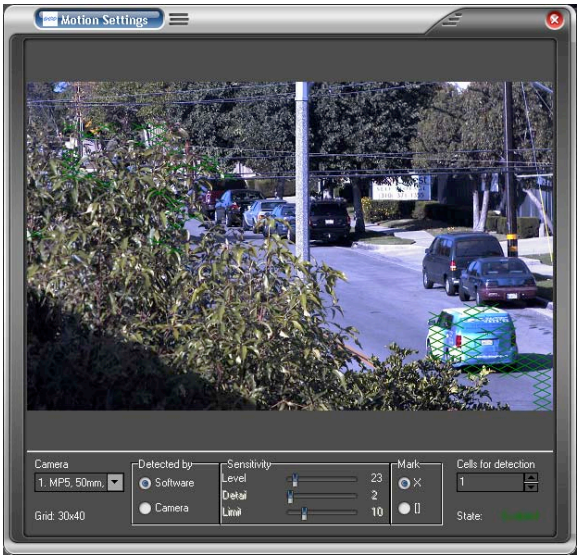
Motion detection is achieved by analyzing inter-frame brightness changes on a pixel-by-pixel basis. There are two modes of Motion Detection supported in MP Video System: a software mode and an on-camera mode.

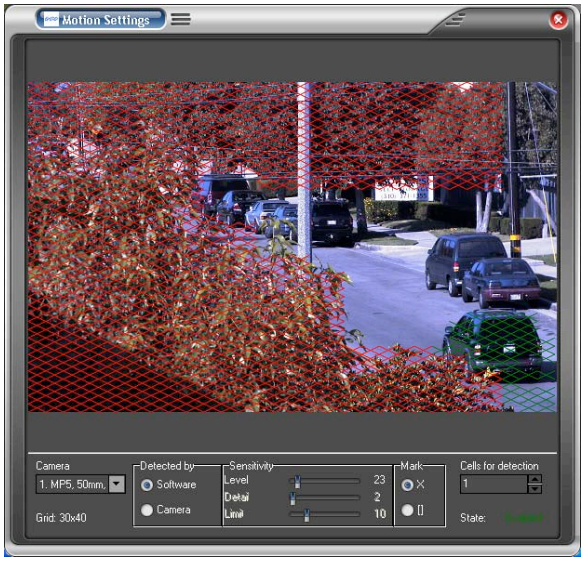
- The software mode performs motion detection by processing the images after they were transmitted from the camera to the computer. In contrast, the on-camera mode performs motion detection prior to transmitting the images to the computer. Thus, the on-camera motion detection allows to significantly reducing the CPU load and the network load when motion detection is enabled.

- Motion detection is enabled via the Archive settings when one of the two following options is selected: "Save all and mark motion" or "Save only motion". If the Archive is enabled for "Save all frames" motion detection is disabled. The Enabled/Disabled status is displayed in the bottom right corner of the Motion Settings window.

- Motion detection is computed independently in multiple detection zones on a square grid. The largest grid supported for any MP camera model and image size is 8 by 8. The actual grid for any particular model is determined by the chosen zone size (a drop-down list in the lower right corner of the Motion Settings screen) and the camera's pixel resolution. The actual grid is displayed in the lower left corner. When motion is present, the Motion Settings window displays green marks (selectable between crosses and boxes) in the zones affected. (*Figure 18*)
- A privacy mask can be set up to block motion detection in some of the zones by drawing a rectangle with the mouse (by left-clicking and holding down the mouse button). The privacy mask is marked with red crosses. A more complex shape can be created by drawing multiple rectangles. Erasing the mask (or part of the mask) is done by drawing a rectangle with the right mouse button.

Figure 18. Image of motion detection





Motion detection settings apply only to the camera which number is displayed in the Camera field on the left of the *Motion Settings* menu: use drop-down list to change the camera number. The settings are:

Detected by provides two options to select between the software motion detection and the on-camera motion detection.
Note: some of the MP camera models may not support motion detection on-camera.

Sensitivity is a group of controls to adjust motion detection computation:

- *Level* adjusts the inter-frame brightness change threshold that triggers motion detection. Lower settings may cause false motion detection due to noise.
- *Detail* adjusts the size of the detectable objects within each motion detection zone. Lower settings may cause false motion detection due to noise.
- *Limit* serves as a guard against false triggering due to a sudden overall change in lighting that would trigger motion detection in a large number of zones simultaneously. If the number of zones activated simultaneously is larger than "Limit", motion detection will be blocked. This parameter cannot exceed the number of zones in the grid (displayed in the lower left corner of Motion Settings).

Save to

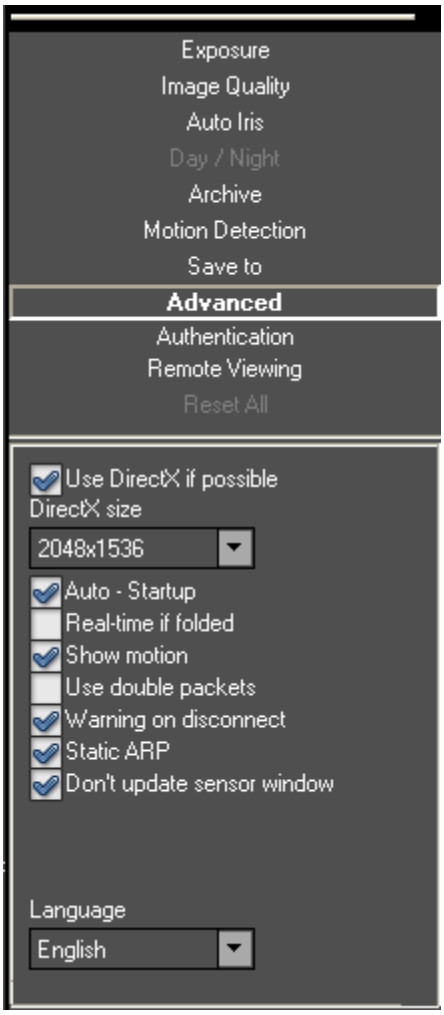
A lower level Save to menu allows to specify the directory path for video archives and for snapshot images. Note that the name of archival directory

should be the same for all cameras; it is possible to specify different Hard Drives for each camera.

Advanced

Select **Advanced** from the *Setting* menu (*figure 19*) to set the following options:

Figure 19. Advanced menu



Don't update sensor window is an option that determines how the changes to the image size are applied: at a software level or in hardware (the image sensor). Enabling this option helps to avoid conflicts when multiple users are viewing the same camera (each will be able to set different image size). Alternatively, disabling this option allows to increase the camera frame rate due to a smaller image size.

Use DirectX if possible is an option to use DirectX functions that utilize graphics card hardware to display images instead of using the software. This reduces the load on the CPU. The drop-down list "DirectX size" provides options for the graphics area supported by DirectX.

Auto – Startup is an option to automatically restart the CBC America Video System with the earlier settings after it was stopped.

RealTime if folded is an option to continue running the CBC America Video System application at the top priority level in the Windows Task Manager after the application was minimized and placed onto the system tray of the Windows task bar.

Show motion is an option to mark the areas of the image where motion was detected.

Use double packets is an option to use data packets with 2904 bytes instead of the regular 1450 bytes for image transmission. This allows increasing image transmission bandwidth, but may lead to a less stable performance on overloaded networks.

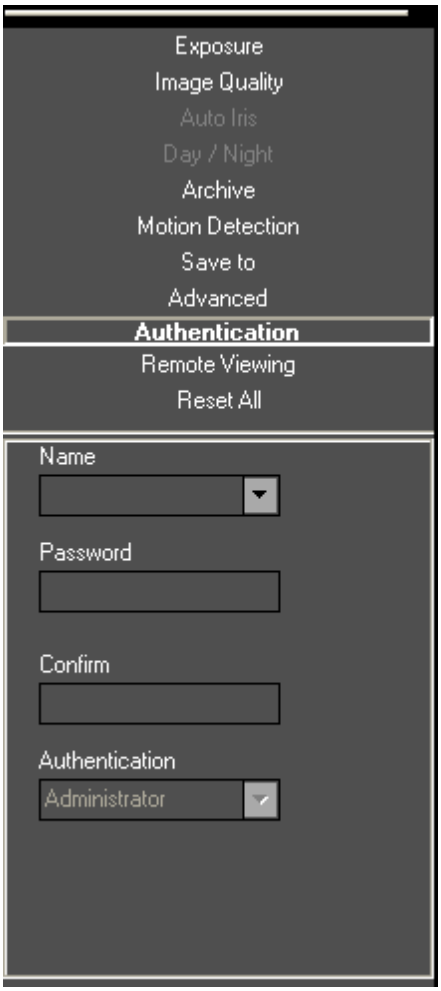
Warning on disconnect is an option to display a red screen warning in place of live video that has been disconnected or temporarily lost. An alternative (when disabled) is to display the last captured frame.

Static ARP is an option to enable a static link between the camera's MAC address and its IP address. An alternative is a dynamic ARP that is not supported by some of the older models of the MP cameras.

Authentication

Authentication is used to set up password-protected access to MP Video System. For any users there are three levels of access available (*Figure 20*):

Figure 20. Authentication menu

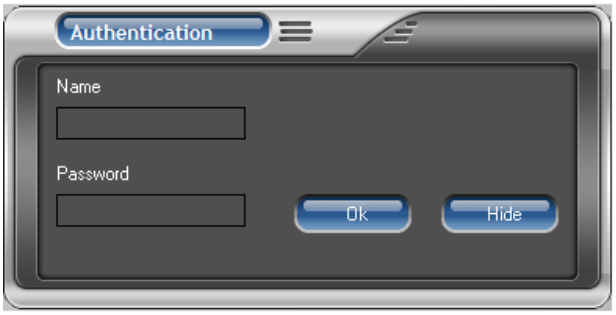


- "Administrator" grants full access to all features of CBC America Video System.
- "Viewer" grants access to live video and browsing the archives, but not to the settings.
- "Live only" grants access to live video only.

Adding, changing, and removing the users is done via three buttons *Add*, *Change*, and *Remove* on the bottom of the menu.

If one or more user accounts were created, the MP Video System will display a log-in dialog prompting for the user name and password (*Figure 21*):

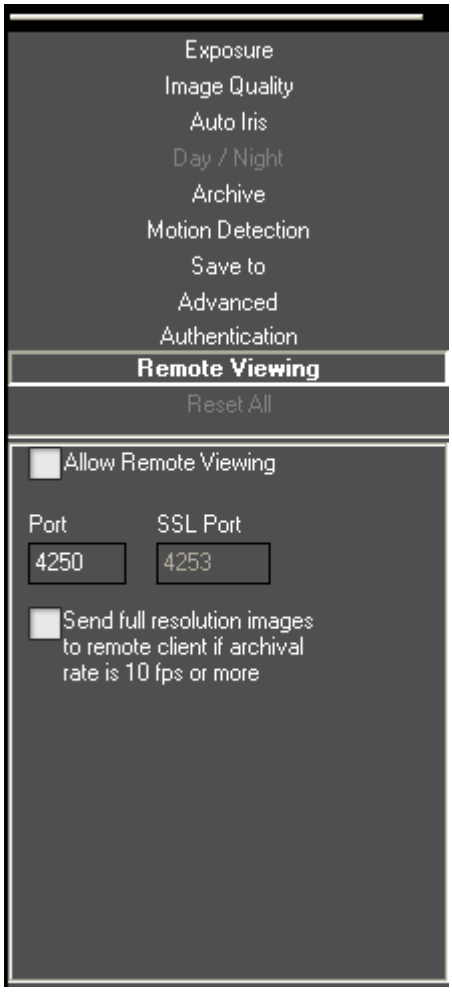
Figure 21. User authentication



Remote Viewing

MP100 software has built-in web server allowing MP cameras and archives to be viewed remotely. (*Figure 22*)

Figure 22. Remote viewing menu



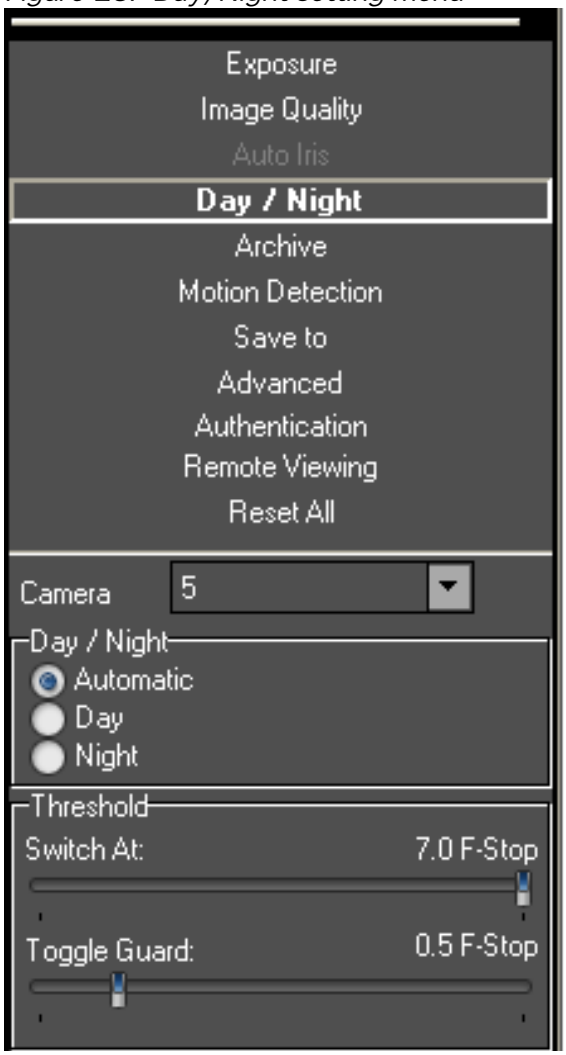
To enable the built – in HTTP server, select **Remote viewing** from the *Setting* menu and do the following:

1. Select **Allow Remote Viewing.**
2. On the bottom of the menu click **Apply** then **Ok**
3. Start Internet Explorer and type in the address of the web server. For example, if the CBC America Video System is installed on a PC with an IP address of 200.168.1.102, type in the following address: http://200.168.1.102:4250/guix.htm
4. Then click **Enter** to have Internet Explorer open that page.
5. Upon successful connection a web page will open. Internet Explorer will prompt to install an ActiveX component. Click on the webpage as prompted to install ActiveX.
6. The main MP menu located on the left hand side of the IE window will provide full access to each MP camera. Selecting the MP camera of choice will display the option to disconnect as well as make changes to settings such as the Resolution, Speed, Archive, Zoom and viewing images in separate windows.
7. Right-clicking anywhere on the Explorer web page will provide access to the options menu:
   - Click **Save** to take a snapshot image.
   - Click **Manage Servers** to provide server information and allows changes to the servers.
   - Click **Auto Hide Menu** to automatically hide the main menu.
   - Click **Settings** to adjust camera and video settings.

Day/Night

Day/Night (*Figure 23*) settings apply only to MP3-DN camera including:

Figure 23. Day/Night setting menu



Automatic enables the camera to automatically switch from daylight conditions (using the color sensor) to nighttime conditions (using the monochrome sensor), and back based on the *Threshold* settings.

Day enables the daylight mode and disables the nighttime mode.

Night enables the nighttime mode and disables the daylight mode.

Threshold adjusts the automatic switching of the camera:

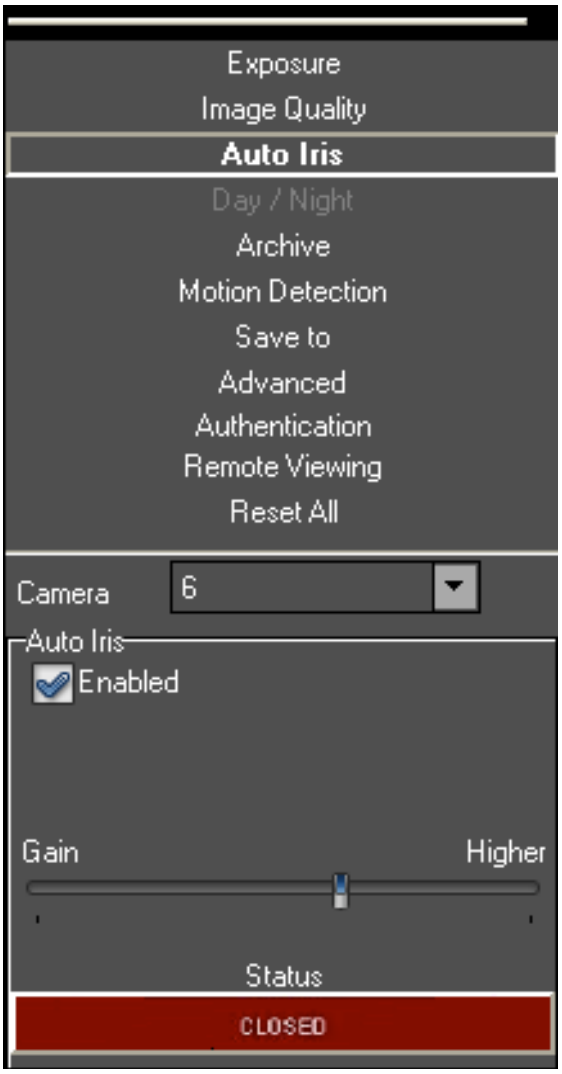
- *Switch At* adjusts the level of darkness to switch from daylight to nighttime mode.
- *Toggle Guard* adjusts the level of brightness to switch from nighttime to daylight mode. Toggle Guard set to 0% corresponds to "Switch At" set to 100%. Toggle Guard should be adjusted to prevent mode toggling during the transitional lighting.

Auto-Iris

The Auto-Iris menu allows you to monitor the state of the automatic DC iris. If the scene is too dark, the camera will open the iris fully. This allows more light onto the sensor and will substantially improve the low-light performance. If the scene is too dark when the camera is started, the camera will not close the iris until there is enough illumination.

Camera DC auto- iris can be configured using “Auto-Iris” menu (*Figure 24*):

Figure 24. Auto-Iris menu



The iris can be disabled by un-checking *Enabled*. The camera will open the iris fully and have electronic auto-exposure working. This configuration is identical to using a manual lens.

The state of the auto-iris is displayed on a color panel which has six different states:

- *Disabled*: The auto-iris is either disabled by un-checking the *Enabled* check box, or is not present.
- *Evaluating*: The camera is preparing to close the iris.

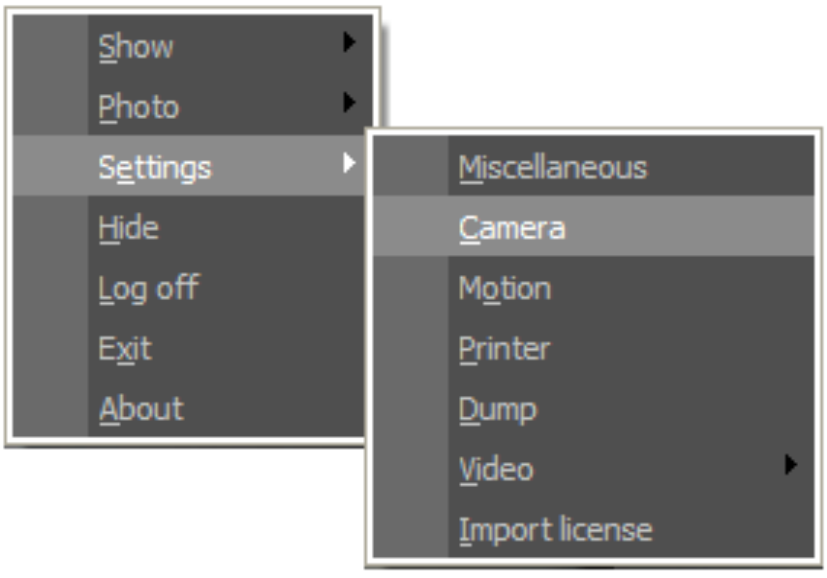
- *Too Dark*. The camera cannot close the iris because the scene illumination is too low.
- *Closing*: The iris is closing down by the number of F-stops appropriate for the lens model.
- *Closed*: The iris is closed.
- *Opening*: The iris is opening.

Auto-iris will open the lens fully once the on-camera analog gains exceed a certain level. *Gain* scroll bar adjusts the point where the auto-iris will open fully: the higher the gain, the later the auto-iris will open as the illumination diminishes.

Right-Click Menu

Right-clicking anywhere within the CBC America Video System screen brings up an additional menu (*Figure 25*):

Figure 25. Additional menu within CBC America Video System screen.



Show presents two options:

- *Archive* enables access to browsing archives (See *Browsing Archives*).
- *Photos* enables access to snapshots taken with the CBC America MP cameras. The default snapshots location is C:\Program Files\CBC America\photo, a different directory path to the snapshot folder can be specified in the Settings menu (see *Settings* on page 26).

Photo enables saving and printing individual snapshots, as well as browsing:

- *Save* takes a snapshot of live video and saves it in the snapshot folder. The snapshot is taken from the camera which is highlighted in the drop-down list of the installed cameras (see *Toolbar* on page 22). To highlight another camera, left-click on the camera number. To take the snapshot from all cameras, highlight "cameras" at the root (top) of the drop-down camera list.
- *Save/Print* takes a snapshot and prints it instantly.
- *Browse* opens the snapshot folder for browsing.

Settings enables access to changing the main groups of settings as described in Settings (see *Settings* on page 26):

- *Miscellaneous* enables access to the following:
  - *Authentication* (see *Permission*).
  - *Remote Viewing* (see *Remote Viewing* on page 40).
  - *Save to* (see *Save to* on page 36).
  - *Advanced* (see *Advanced* on page 37).
- *Camera* enables access to a combined menu that includes:
  - Image Quality (see *Image Quality* on page 31)
  - Exposure (*see Exposure* on page 27)
  - Day/Night (see *Day/Night* on page 42)
  - Auto-Iris (see *Auto-Iris* on page 44)
  - Archive (see *Archive* on page 33).
  - It also includes some of the options in *Advanced* settings (see *Advanced* on page 37).
- *Motion* enables access to Motion Settings (see *Motion detection* on page 34).
- *Printer* opens up the **Print Setup** menu.
- *Dump* logs camera settings to a file named LocalMachine.ini located in the installation directory. When contacting CBC (America)'s technical support, this file should be included.
- *Video* displays live video in full-screen mode.

Hide minimizes the MP Video System application and hides it in the system tray of the Windows task bar.

Log off logs off the current user.

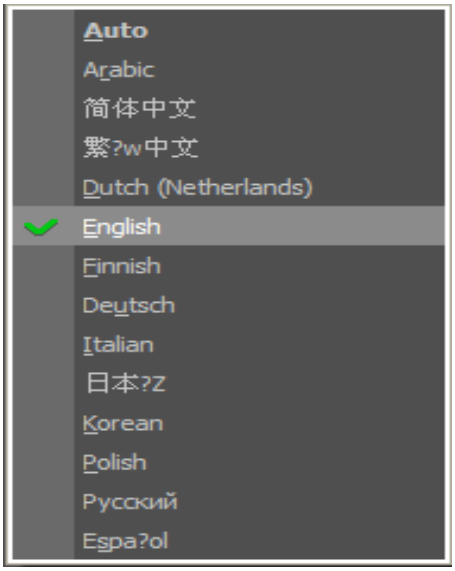
Exit exits the CBC America Video System application.

About shows the version of the CBC America Video System software and additional information for each of the installed camera(s): version of firmware, MAC address, and IP address.

Language Selection

CBC America Live Video System supports interfaces in Arabic, Chinese Simplified, Chinese Traditional, English, Finnish, German, Japanese, Spanish, Russian and other languages. To select language press the F2 button to bring up the language menu (*Figure 26*).

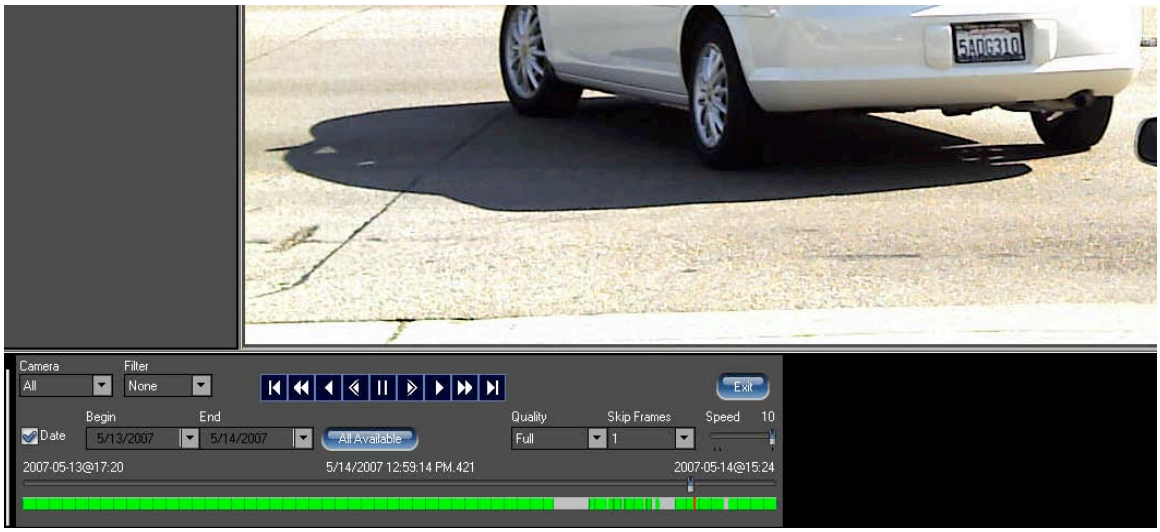
Figure 26. Language menu



Browsing Archives

Archive browsing is enabled by pressing the button in the Toolbar, or via the right-click menu (see *Right-Click Menu* on page 40).

Figure 27. Archive screen



Archive browsing controls are located on the bottom of the playback screen (*Figure 27*). Archives are best viewed when the video is displayed in full-screen mode. The date-and-time stamp is located on the top left-hand side of the image. The user can select playback speed and frame skipping, as well as the image quality. If the archive was recorded using motion detection (see Motion Detection), browsing can be based on detected motion by selecting "Motion" from the drop-down list under "Filter".

- Rewind - Starts browsing from the start of recording
- Fast Reverse
- Play in Reverse – Plays the recorded archive continuously in reverse
- Play by Frame in Reverse – Starts the playback one frame at a time reverse
- Pause – Pauses the playback.
- Play by Frame Forward – Starts playback one frame at a time forward.
- Play – Plays the recorded archive continuously forward.
- Fast forward
- Forward - Starts browsing from the end of recording.

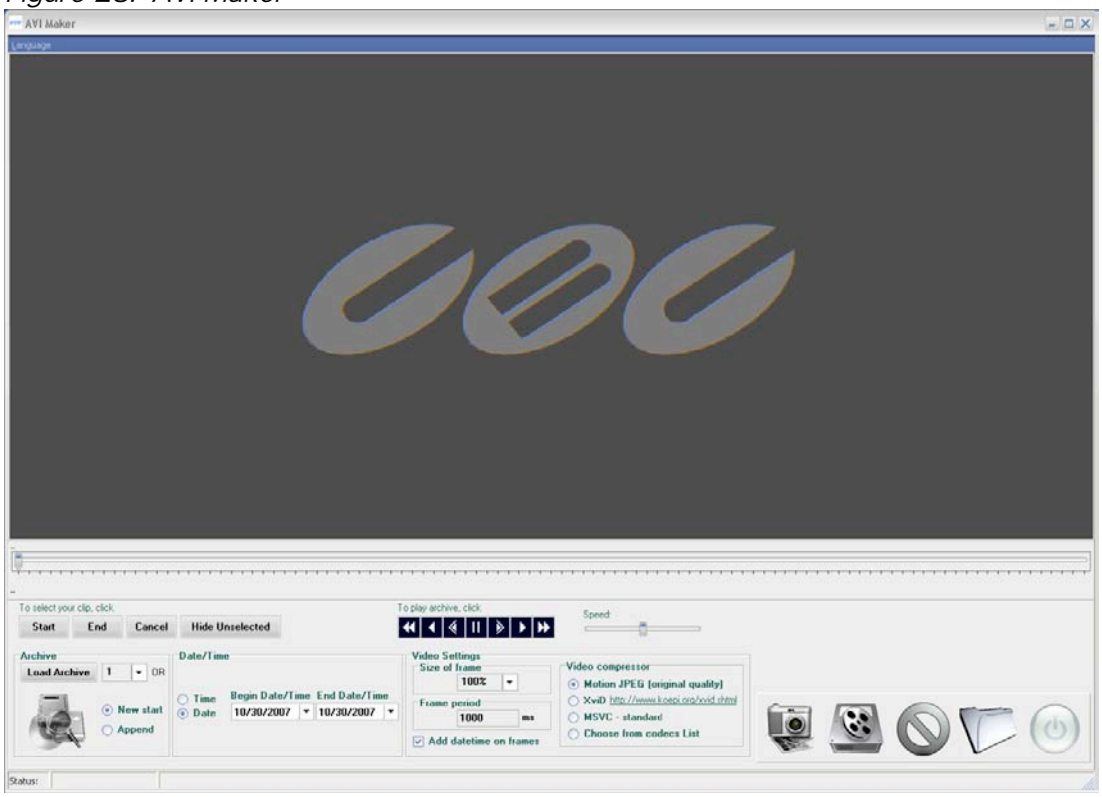
The slider on the bottom of the screen displays/positions the current frame position in the archive. It has a date-and-time display located to the right side of the slider to reference a particular event.

To take a snapshot from the archive use button from the Toolbar. Alternatively, snapshots can be taken by right-clicking on the video image, and then selecting "*photo*", "*save*".

AVI Maker - Making video clips from the archive

The AVI Maker (*Figure 28*) is started by clicking the corresponding Run button in the CBC Application Manager.

Figure 28. AVI Maker



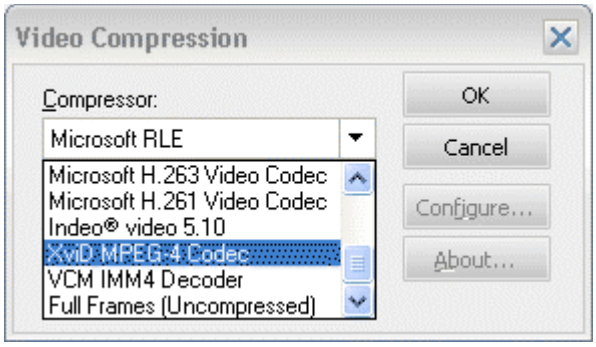
NOTE: PLEASE MAKE SURE THAT THE ARCHIVE IS NOT EMPTY WHEN MAKING AVI CLIPS.

To make video from archive, please do the following steps:

1. Using the *Load Archive* drop-down list on the left select the camera for making the video clip from.
2. Using the *Date/Time* is for setting the start and the end of the archived events to be converted into the AVI video clip.
3. Using the *Video Settings* provides three options:
    - *Size of Frame* adjusts the AVI frame size relative to the archived frame size.
    - *Frame Period* adjusts the AVI frame rate (in milliseconds). If this setting does not match the archived frame rate, the AVI video will be playing accordingly faster or slower.
    - *Video Compression* offers three options for making the AVI file:

- *Motion JPEG (Original Quality)*
- "XviD – http://www.koepi.org/xvid.shtml" is a codec recommended by CBC America (it is included in the MP Software Setup, and is typically installed during the CBC America software installation). This codec has been found to produce very good quality and compression of resulting AVI files.
- "MSVC - standard" is a standard Microsoft video codec.
- "Codec List" allows selecting any of the alternative codecs that are installed on the computer. The drop-down list opens after "Make AVI" is clicked (*Figure 29*).
    - We recommend using divx codec

Figure 29. Video Compression



4. Click *Make AVI*. If no records are available for the selected range of dates or times a warning will be displayed.
5. In the *Save as* window type in a file name for your new AVI file, then click Save. If "Codec List" was selected under "Video Compression" the drop-down list of available codecs will appear. Select a codec from the list to proceed.
6. The AVI Maker will begin to create the AVI and show the progress in the progress bar. Optionally, click Stop to terminate the process earlier than the end date/time set under *Date/Time*.

Firmware Loader - Upgrading the Cameras

All models of MP cameras are field-upgradeable. MP Firmware Loader is the utility for upgrading the camera's firmware and/or hardware. Note: all MP cameras starting with firmware revision 51821 support firmware upgrades, and all MP cameras with MAC address ending with 62-00 and above also support hardware upgrades.

NOTE: IT IS RECOMMENDED THAT THE USER RUNS MP CAMERA INSTALLER IMMEDIATELY PRIOR TO RUNNING THE FIRMWARE LOADER. The MP Firmware Loader is started by clicking the corresponding Run button in the CBC Application Manager, if the MP Firmware Loader was installed in the CBC America folder.

To upgrade a camera, please do the following:

1. Click "**Find Cameras**". It may take up to a minute to find the camera(s). Once the camera(s) have been found select the camera(s) to upgrade.
2. To upgrade the firmware:
   - Click "**Upgrade Firmware**" and choose the firmware upgrade file. The file name starts with "*fwupdate*", and the file extension is .txt. MAKE SURE THAT THE CAMERA MODEL YOU ARE UPGRADING IS INCLUDED IN THE FWUPDATE FILE NAME.

- The firmware upgrade will start automatically. Do not disconnect the MP camera. When the upgrade is complete "*Success!*" message will be displayed with the new version of firmware.

3. To upgrade the hardware:
   - Click "**Upgrade Hardware**" and choose the hardware upgrade file. The file name starts with "hwupdate", and the file extension is .bin. MAKE SURE THAT THE CAMERA MODEL YOU ARE UPGRADING IS INCLUDED IN THE HWUPDATE FILE NAME.
   - The hardware upgrade will start automatically. Do not disconnect the MP camera. When the upgrade is complete "Success!" message will be displayed with the new revision of hardware.

IMPORTANT: DISCONNECTING THE POWER TO THE CAMERA DURING THE UPGRADE WILL RESULT IN PERMANENT DAMAGE TO THE CAMERA.

Chapter 3. HTTP Access

Non-Panoramic Cameras

This chapter describes the HTTP access of CBC (America) cameras MP1, MP2, MP3, MP3-DN, and MP5. HTTP access of panoramic cameras MP8D and MP8P are described in the next chapter.

CBC (America) cameras support two protocols, TFTP and HTTP. TFTP protocol is recommended for application scenarios where high quality video at full frame rate is preferred. The drawback (if any) is that the implementation of TFTP protocols usually requires significant engineering efforts. Although CBC (America) provides a manufacturer SDK which makes it easy and simple to interface MP cameras, there are still a significant number of applications that do not favor the use of TFTP protocols. The reason for not using TFTP protocol varies. For example, certain applications simply do not require full frame rate operation; some applications are limited by the availability of time and/or software development resources.

CBC (America) cameras support access of MP cameras via HTTP protocol. The performance in terms of data rate is comparable to other multi-megapixel products available on the market. This chapter explains the usage of HTTP commands supported by CBC (America) cameras of model MP1, MP2, MP3, MP3-DN, & MP5.

Camera Web Page

MP cameras can be accessed from IE browser via the on-camera web page. The web page allows changing camera settings and to view live video by means of Java script stored in camera's non-volatile memory. The web page is accessed by typing in web-browser:

HTTP://ip_address or http://ip_address/index.html

In addition to the web page MP cameras also implement html video container that can be used for incorporation of the camera URL into user's own html page. Video container is accessed from:

http://ip_address/livevideo

To incorporate the video container in the user's html page, the user should add the following line in the body of the page:

```
<iframe
src="http://200.168.1.10/"width="800"height="600"marginheight="0"marginwidth="0"scrolling="no">
</iframe>
```

where parameters width and height specify the image size requested from the camera.

HTTP JPEG Image Request Format

IMPORTANT: COMPLETE SET OF HTTP REQUESTS DESCRIBED IN THIS DOCUMENT IS SUPPORTED FOR FIRMWARE VERSIONS 61430 AND ABOVE. IF YOU HAVE MP CAMERA WITH LOWER FIRMWARE VERSION CONTACT CBC (America) Corp. FOR A FIRMWARE UPGRADE.

The individual image can be requested from MP cameras by using the following HTTP request format:
HTTP://ip_address/image?res=resolution_value&x0=X0&y0=Y0&x1=X1&y1=Y1&quality=quality_value&doublescan=doublescan_value&id=value
where

- *res* can have value of either full or half and specifies whether camera should decimate the image by a factor of 2 in each direction;
- *X0, Y0, X1, Y1* are the left, top, right and bottom coordinates of the requested image window, respectively. These values can not exceed the size of the image sensor array for the specific camera;
- *quality* is the compression quality of the jpeg image with the range from 1 to 20;
- *doublescan* is the parameter that allows the user to specify whether the camera should delay the image output until the new image is available (doublescan = 0) or the image request should be serviced by outputting the content of the image buffer that was already once output (useful for picture-in-picture display).
- *id* is the optional field that is ignored by the camera but may be set by the user to a random value to force some browsers to display the new image.

The following example illustrates the request to camera with IP address 192.168.0.36 for the new full resolution 1600x1200 image with compression quality 12:

HTTP://192.168.0.36/image?res=full&x0=0&y0=0&x1=1600&y1=1200&quality=12&doublescan=0

The user also has the option of specifying default image parameters via parameter "set" requests and then obtaining the image by using a simple request without additional parameters: HTTP://ip_address/img.jpg

The cameras also have built-in web page suitable for control of main camera parameters and for live display of the images in IE, Opera and Mozilla web browsers. This script is accessed via the following HTTP request:

HTTP://ip_address or HTTP://ip_address/index.html

HTTP MJPEG Image Stream Request Format

Continuous sequence of JPEG images (MJPEG) separated by the boundary separator can be requested from MP cameras by using the following GET method request format:

GET/mjpeg?res=resolution_value&x0=X0&y0=Y0&x1=X1&y1=Y1&quality=quality_value&doublescan=doublescan_value&fps=value&id=value
HTTP/1.1\r\n
Host: ip_address\r\n
\r\n

where

- res can have value of either full or half and specifies whether camera should decimate the image by a factor of 2 in each direction;
- X0, Y0, X1, Y1 are the left, top, right and bottom coordinates of the requested image window, respectively. These values can not exceed the size of the image sensor array for the specific camera;
- quality is the compression quality of the jpeg image with the range from 1 to 20;
- doublescan is the parameter that allows the user to specify whether the camera should delay the image output until the new image is available (doublescan = 0) or the image request should be serviced by outputting the content of the image buffer that was already once output (useful for picture-in-picture display).
- fps specifies the requested frame rate; values 1 to 15 result in the specified frame rate, while omitting fps parameter as well as fps values of

0 and all values above 16 result in maximum frame rate that is model dependent.

The following example illustrates the request to camera with IP address 192.168.0.36 for the new full resolution 1600x1200 image stream with compression quality 12 at maximum frame rate:

```
GET /mjpeg?res=half&x0=0&y0=0&x1=1600&y1=1200&quality=12&doublescan=0
HTTP/1.1\r\n
Host: 192.168.1.11\r\n
\r\n
```

In response to the above request the camera sends continuous stream of images separated by the boundary separator "fbdr" in accordance with MIME multipart/x-mixed-replace format. Please note that MIME multipart/x-mixed-replace format is not directly supported by Internet Explorer and requires user application to correctly process the image stream. For video viewing based on IE only the users should use on-camera script that can be accessed via HTTP://ip_address/index.html request.

```
HTTP/1.0 200 Ok\r\n
Content-Type: multipart/x-mixed-replace;boundary=fbdr\r\n
\r\n
--fbdr\r\n
Content-Type: image/jpeg\r\n
\r\n
<JPEG image 1 data>
\r\n
--fbdr\r\n
Content-Type: image/jpeg\r\n
\r\n
<JPEG image 2 data>
\r\n
--fbdr\r\n
...
Content-Type: image/jpeg\r\n
\r\n
<JPEG image n data>
\r\n
--fbdr\r\n
```

Basic Camera Control Parameters

The camera parameters can be accessed via the HTTP requests of the following format:
HTTP://ip_address/set?parameter=value
HTTP://ip_address/get?parameter

Examples:
HTTP://192.168.0.36/set?brightness=15
HTTP://192.168.0.36/get?brightness

The following parameter requests are supported via HTTP protocol by MP cameras:

- *brightness* – image brightness (valid values are from -50 to 50)
- *sharpness* – image sharpening(valid values are from 0 to 4)
- *saturation* – color saturation (valid values from 0 to 6)
- color balance adjustment (tint)
  - *blue* (valid values from -10 to +10)
  - *red* (valid values from -10 to +10)
- *illum* – illumination setting for auto white balance (valid values are auto, indoor, outdoor, mix)
- *freq* – frequency of AC powered light sources (valid values are 50 and 60)
- *lowlight* – low light mode of the camera, allows tradeoff between frame rate and image quality (valid values are balance, speed, quality, highspeed, moonlight). If highspeed is used, an additional parameter *shortexposures* can be set with valid values 1 through 10.
- *rotate* – image rotation (valid values are 0 and 180)
- *autoexp* – allows to turn on and off auto exposure (valid values are on and off)

- *expwndleft* - left coordinate of user-defined auto-exposure measurement window (valid values should fall within sensor window)
- *expwndtop* - top coordinate of user-defined auto-exposure measurement window (valid values should fall within sensor window)
- *expwndwidth* - width of user-defined auto-exposure measurement window (valid values should fall within sensor window)
- *expwndheight* – height of user-defined auto-exposure measurement window (valid values should fall within sensor window)
- *sensorleft* - left coordinate of sensor window (valid values defined by sensor size)
- *sensortop* - top coordinate of sensor window (valid values defined by sensor size)

- *sensorwidth* - width of sensor window (valid values defined by sensor size; this value affects sensor frame rate)
- *sensorheight* - height of sensor window (valid values defined by sensor size; this value affects sensor frame rate)
- *imgleft* - left coordinate of default image returned in response to the simple request http://ip_address/img.jpg (valid values should fall within sensor window)
- *imgtop* - top coordinate of default image returned in response to the simple request http://ip_address/img.jpg (valid values should fall within sensor window)
- *imgwidth* – width of default image returned in response to the simple request http://ip_address/img.jpg (valid values should fall within sensor window)
- *imgheight* - height of default image returned in response to the simple request http://ip_address/img.jpg (valid values should fall within sensor window)

- *imgquality* – quality setting of image returned in response to the simple request http://ip_address/img.jpg (valid values 1 to 21)
- *imgres* – resolution of default image returned in response to the simple request http://ip_address/img.jpg (valid values are full and half, where half is used to request images decimated by a factor of 2 in both directions)
- *auto-iris* – allows to enable and disable auto-iris (valid values are on and off)
- *irisgain* – allows to specify threshold for closing the auto-iris (valid values are from 8 to 255)
- *save* – saves current camera configuration (all parameter values) in the non-volatile memory http://ip_address/set?params=save
- *mac* – retrieves the MAC address of the camera (read-only)
- *model* – retrieves last 4 numbers of the camera model (read-only, e.g. MP2100 camera will return 2100)
- *fwversion* – retrieves firmware version of the camera
- *procversion* – retrieves version of the image processor
- *netversion* – retrieves version of the network processor
- *revision* – retrieves the revision code of the PCB
- *factory* – restores camera parameters to factory defaults http://ip_address/set?params=factory
- access to camera registers: setreg?page=page_number&reg=register_number&val=register_value

Parameters Specific to MP3-DN DAY/NIGHT Cameras

MP3-DN camera utilizes two distinct sensors for its day and night modes. Specifically, 3-Megapixel color sensor with IR-cut filter is used in the day mode, while 1.3-Megapixel monochrome sensor without IR-cut filter is used in the night mode.

As MP3-DN camera has two sensors with different resolutions it is most convenient to specify the required image size in terms of percentages of the full image size as shown in the following example:
HTTP://200.168.1.10/image?res=full&x0=0%&y0=0%&x1=100%&y1=100%&quality=12&doublescan=0

By default, the camera automatically switches between day and night channels as illumination changes. However, it is also possible to force the camera to operate in either day or night channel by using *daynight* request. The switch point between day and night modes is determined based on overall AE/AGC gain and can be adjusted via parameter *nightgain*. To avoid oscillations between day and night modes, the night-to-day transition is specified via parameter *daygain* in terms of "hysteresis" relative to day-to-night transition threshold.

- *daynight* – if set to "auto" the camera will select between color and monochrome channels automatically based on *daygain* and *nightgain thresholds* (valid values are "auto", "day" and "night")
- *nightgain* – allows to specify the automatic switching point for day-to-night transition in proportion to overall exposure*gain value; The user may need to adjust this value if the lenses on day and night channels have different f-stops; Higher values will cause the transition to night mode at lower illumination level (valid values are from 0 to 18)

- *daygain* – allows to specify the automatic switching point for night-to-day transition as "hysteresis" relative to night-to-day transition; Higher values will cause the transition to day mode at higher illumination level (valid values are 0 to 6, 0 is not recommended)

Motion Detection Control Parameters

The unique design of MP cameras allows supporting highly accurate 64-zone motion detection (also see Motion Detection). Motion detection is achieved by analyzing inter-frame brightness changes on a pixel-by-pixel basis. To provide accurate motion detection in low contrast and low light environments, EACH pixel of EACH frame is analyzed. The user can set the size of motion detection zones (via *mdzonesize*), select the sensitivity to motion (via *mdlevelthreshold*), select the zones where the motion detection has to be blocked (via *mdprivasymask*) and specify the size of the moving objects of interest (via *mddetail*). Motion detection information can be obtained from the camera in terms of "amount" of motion in each zone (via *mdresult*) In addition to retrieving motion detection information, the camera can also be configured to output images only if motion is detected (via *mdmode*).

On-camera motion detection unit utilizes up to 64 distinct zones. All zones are square, have equal size and are arranged in 8 rows with 8 zones per row. The zones are numbered from 0 to 63, upper leftmost zone having number 0 and lower rightmost zone having number 63. The zones are broken into sub-zones of size 32x32 pixels. The size of zones is specified in terms of the square root of the number of sub-zones via parameter *mdzonesize*. The zones can be defined to be as small as 7x7 sub-zones to as large as 15x15 sub-zones. By setting the limit on how many sub-zones should contain the motion for the entire zone to be considered to contain motion the user can effectively decide on the size of the moving objects that should be detected. This is done via parameter *mddetail*.

- *motiondetect* – enables on-camera motion detection (valid values are "on" and "off")
- *mdmode* – motion detection mode for mjpeg streams(valid values are "on" and "off"); if set to "on" the camera will only output an image in the presence of motion; If the motion is not detected, the field following the frame boundary separator --fbdr will be followed by Content-Type: text/plain (instead of usual -Type: image/jpeg) and the image data will be substituted with the text message "no motion"
- *mdtotalzones* - number of independent motion detection zones; Currently must be 64. There are 8 rows of zones, 8 zones per row. Note that depending on zone size and the camera model (image resolution in terms of the number of pixels)some zones may not correspond to the active image area (valid value 64)

- *mdzonesize* – size of motion detection zones measured in number of 32x32 pixel blocks in each zone; All zones are squares of the same size from 7x7 to 15x15 (valid values are 7 to 15 for MP1 and MP2 and 8 to 15 for AV3100 and MP3-DN)
- *mdlevelthreshold* – motion detection threshold that determines the sensitivity to local inter-frame brightness changes (valid values are 2…31). Lower settings may cause false motion detection due to noise. This parameter corresponds to "Level" under "Motion Settings" in AV Video System GUI.
- *mdsensitivity* – sensitivity of the motion detection to sudden overall lighting changes. This allows preventing false triggering due to sudden overall brightness change that triggers motion detection in a large number of zones simultaneously. If more than this number of zones have motion it is assumed that the change is due to lighting change and detected motion is ignored; (recommended values are 40 for MP3-DN, 30 for MP2 and 20 for MP1). This parameter corresponds to "Limit" under "Motion Settings" in AV Video System GUI.
- *mddetail* – allows controlling the size of detectable moving objects. The value is the number of 32x32 sub-zones within each zone that should contain motion for the entire zone to be considered to contain motion. (valid values are 1 through square of *mdzonesize*). This parameter corresponds to "Detail" under "Motion Settings" in MP Video System GUI.
- *mdprivasymask* – Privacy matrix. An 8-byte array, where each byte corresponds to one row of motion detection zones. Each bit in a byte enables motion detection in a corresponding zone, if set to '1'. Leftmost zone is controlled by MSB, rightmost zone by LSB.

  Example: set?mdprivasymask=2a8f3d135b71ee04 results in the following enabled zones relative to camera image:

  01010100
  11110001
  10111100
  11001000
  11011010
  10001110
  01110111
  00100000
- *mdresult* – Motion detection information returned by the camera; The return value is "no motion" if motion has not been detected, otherwise the motion detection information is returned in the following format:

mdresult=<SP><hexadecimal byte0><SP><hexadecimal byte1>...<SP><hexadecimal byte63>

where <SP> is the SPACE symbol, and the byte value, byteN, indicates the number of sub-zones (blocks of 32x32 pixels) with motion within zone N. Note: the sub-zone size is fixed to 32x32 and cannot be changed. Important: the user should keep in mind that the total number of zones is always 64 (8 vertically and 8 horizontally). Therefore, if the zone size is large, some zones may not correspond to the active pixel array. In that case their motion detection value is not meaningful and should be ignored. For example, for MP1 camera: if the image size is 1280x1024, then for zone size 8x8 there are 5 by 4 active zones (3 zones after every 5 zones must be ignored as well as all zones after zone 32). Example:

mdresult= 00 1A 01... means that in zone 0 motion was not detected, in zone 1 there are 26 (32x32) sub-zones with motion, in zone 2 there is one sub-zone 1 with motion ….

Access Control

CBC (America) cameras support dual-level password-protected access control. Camera authentication is compatible with RFC-2068 HTTP 1.1 and is supported by all standard browsers and video surveillance software.

There are two types of users with the following reserved names:

admin – has full access to all camera settings and the video.
viewer – has viewing access to all current camera settings and the video.

Setting and removing the passwords is the privilege of the **admin** user, while the **viewer** can only use the existing password, but not change it. Factory defaults erase all current passwords for both the **admin** and the **viewer.** A newly shipped camera has no password protection and allows full anonymous access from the network. In case the **admin** password has not been set, the camera has full anonymous access from the network, even if the **viewer** password has been set.

Access control setup consists of three steps:

1. Set **admin** password (using http commands or using the camera's web page, see below).
2. Log-in using the **admin** password and set the **viewer** password.
3. Communicate the **viewer** password to the users.

In order to delete **viewer** password, log-in as **admin** and change the viewer password to a reserved password **empty** – this would restore the full anonymous access to the camera. The **admin** user can change the **viewer** password at any time, even without knowing the current **viewer** password.

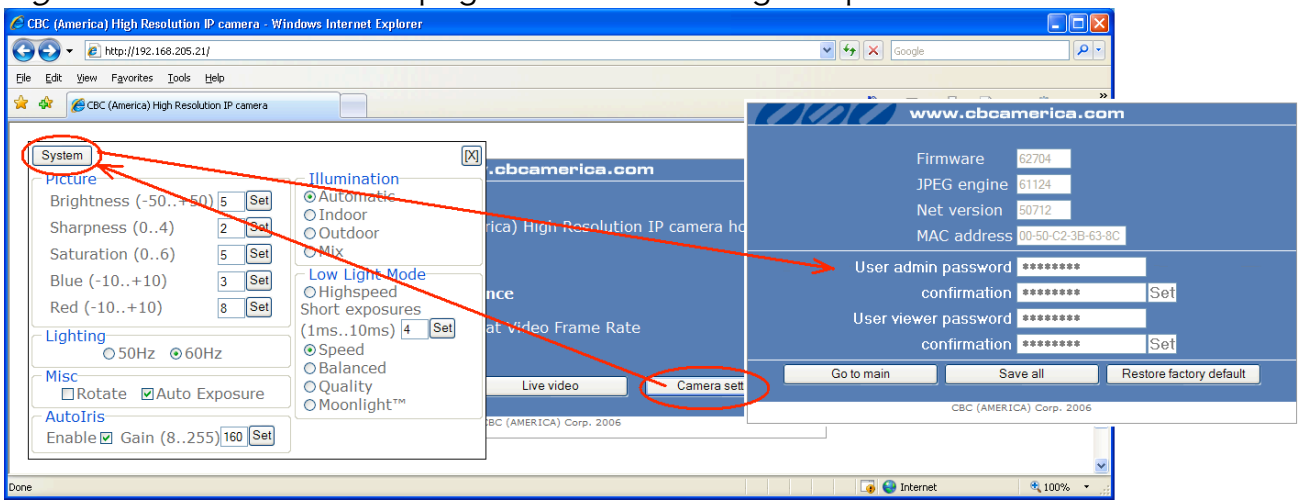
NOTE: if the **admin** password has been set and forgotten, it can only be erased through reprogramming the camera's firmware, or by accessing the camera registers via developers' register access from MP100 software.

HTTP commands for password setting:

1. For **admin** passwords:
   http://camera_IP/get?admin
   http://camera_IP/set?admin=(a_string_of_1..8_ASCII_symbols_or_"empty")
   The reserved password **empty** is used to erase the existing password.

2. For **viewer** passwords (*Figure 30*):
   http://camera_IP/get?viewer
   http://camera_IP/set?viewer=(a_string_of_1..8_ASCII_symbols_or_"empty")
   The reserved password **empty** is used to erase the existing password.

Figure 30. Camera's web page menu for setting the passwords



HTTP/1.1 vs. HTTP/1.0

CBC (America) cameras support both HTTP/1.0 and HTTP/1.1 protocols as defined by RFC-1945 and RFC-2068, respectively. While HTTP/1.0 is simple, it limits the speed of image transmission for cases when the user requests individual images rather than MJPEG stream. This is due to the fact that connection is closed after the transmission of each image, forcing the client to

incur round trip delay repeatedly. However, HTTP/1.0 is supported by all HTTP implementations and can be used reliably, albeit with limited speed. By default, CBC (America) cameras are configured to respond using HTTP/1.0 protocol regardless of the HTTP version used by the client.

The users who desire faster full duplex communication and image delivery may request responses over HTTP/1.1 protocol. To do so, the user should append parameter ver=HTTP/1.1 to the request string as shown in the following example: HTTP://192.168.0.36/image?res=full&x0=0&y0=0&x1=1600&y1=1200&quality=12&doublescan=0&ver=HTTP/1.1

It is important to note that MP cameras implement "chunked" transfer encoding as defined by paragraph 14.40 of RFC-2068. While RFC-2068 requires that all HTTP/1.1 implementations support "chunked" encoding, in reality many older implementations (Indy 9, WinHTTP 5.0, etc) are not fully compliant with the requirements of the standard. As a result, if the HTTP/1.1 protocol is requested from a non-compliant implementation, the chunks separators will remain in the data stream and the jpeg image will be corrupted. If the user receives corrupted images over HTTP/1.1 the user should either remove HTTP/1.1 specification from the request or upgrade the HTTP implementation to fully compliant (e.g. WinHTTP 5.1)

HTTP Access of Panoramic Cameras

IMPORTANT: COMPLETE SET OF HTTP REQUESTS DESCRIBED IN THIS DOCUMENT IS SUPPORTED FOR FIRMWARE VERSIONS 61621 AND ABOVE. IF YOU HAVE MP CAMERA WITH LOWER FIRMWARE VERSION CONTACT CBC (America) Corp. FOR A FIRMWARE UPGRADE.

Notational conventions:

- camera_ip : IP address of the camera;
- get : get a parameter from camera via http;
- set : set a parameter on camera via http;
- <channel> : camera channel number from 1 to 4;
- "" : a symbol string in ASCII;
- | : means one or another, but not both;
- ( ) : allowable values;
- .. : a range of values in increments of 1;
- +/- : positive values do not need the "+" sign, while the negative values do need the "-" sign in front of the value;

- [ ] : non-mandatory value which could be dropped.

In order to access the built-in camera's web page type either of the two following http commands into the web browsers' address field:

http://camera_ip/
http://camera_ip/index.html

Requesting Images from Camera

The MP8D and MP8P camera supports two types of image requests: single JPEG image requests (image or img.jpg) and motion JPEG stream requests (mjpeg). The maximum number of supported simultaneous requests of single images or mjpeg streams is eight.

NOTE: Even though the camera supports multi-user access, the maximum frame rate is achieved only when there is a single request arriving to each channel at any given time.

1. Requesting single JPEG images

1.1 Requesting images using explicit parameter list within the HTTP string:

http://camera_ip/image[<channel>]?res=(half|full)&x0=(0..1600)&y0=(0..1200)&x1=(32..1600)&y1=(32..1200)&quality=(1..21)&doublescan=(0|1)&[id=(0..9999999999999)]&[ssn=(0..65535)]

where:
res – image resolution (full or half);
x0,y0,x1,y1 – image cropping coordinates;
quality – image quality, the inverse of image compression level;
doublescan –read mode (reserved for future use);
id – an arbitrary number used to control the web browser's cache;
ssn – a unique HTTP session number which cancels out any earlier sent HTTP request with the same number which got "hung";

NOTE: an **image** request without <channel> parameter specified will cause the camera to transmit the next available image from any of the currently enabled channels. The channel number of the transmitted image could then be identified from the HTTP header Etag (see RFC-2068 HTTP 1.1): **ETag: Channel<channel> .**

1.2 Requesting images using implicit parameter list (parameters are loaded on camera in advance using separate http commands (see section B 16 below):

http://camera_ip/img.jpg?[id=(0..99999999999999)]&[ssn=(0..65535)]

where:
id – an arbitrary number used to control the web browser's cache;
ssn – a unique HTTP session number which cancels out any earlier sent HTTP request with the same number which got "hung";

2. Requesting Motion JPEG image stream

http://camera_ip/mjpeg[<channel>]?res=(half|full)&x0=(0..1600)&y0=(0..1200)&x1=(32..1600)&y1=(32..1200)&quality=(1..21)&doublescan=(0|1)&[fps=(0..15)]&[id=(0..99999999999999)]&[ssn=(0..65535)]

where:
res – image resolution (full or half);
x0,y0,x1,y1 – image cropping coordinates;
quality – image quality, the inverse of image compression level;
doublescan –read mode (reserved for future use);
fps – desired frame rate (frames per second);
id – an arbitrary number used to control the web browser's cache;
ssn – a unique HTTP session number which cancels out any earlier sent HTTP request with the same number which got "hung";

NOTE: an **mjpeg** request without <channel> parameter specified will cause the camera to transmit next available image from any of the currently enabled channels. The channel number of the transmited image could then be identified from the HTTP header Etag (see RFC-2068 HTTP 1.1):
ETag: Channel<channel> .

Getting and Setting Camera Parameters

NOTE: All commands listed below that allow parameter setting without explicitly specifying the channel number apply to all four channels.

NOTE: Parameter setting is allowed only for the users with the **admin** access level (see below under Camera Access Control).

1. Enabling camera channels:
   http://camera_ip/get?channelenable
   http://camera_ip/set?channelenable=(1..15 as a 4-bit mask where each bit corresponds to one camera channel, LSB is channel 1)

2. Image rotation:
   http://camera_ip/get<channel>?rotate
   http://camera_ip/set[<channel>]?rotate=(0|180)

3. Brightness:
   http://camera_ip/get<channel>?brightness
   http://camera_ip/set<channel>?brightness=(-50..+50)

4. Sharpness:
   http://camera_ip/get<channel>?sharpness
   http://camera_ip/set<channel>?sharpness=(0..4)

5. Saturation:
   http://camera_ip/get<channel>?saturation
   http://camera_ip/set<channel>?saturation=(0..6)
6. Blue balance:
   http://camera_ip/get<channel>?blue
   http://camera_ip/set<channel>?blue=(-10..+10)

7. Red balance:
   http://camera_ip/get<channel>?red
   http://camera_ip/set<channel>?red=(-10..+10)

8. Illumination:
   http://camera_ip/get<channel>?illum
   http://camera_ip/set<channel>?illum=("auto"|"indoor"|"outdoor"|"mix")

9. Mains frequency, Hz (for indoor lighting compensation):
   http://camera_ip/get<channel>?freq
   http://camera_ip/set<channel>?freq=(50|60)

10. Exposure mode (low light mode):
    http://camera_ip/get<channel>?lowlight
    http://camera_ip/set<channel>?lowlight=("highspeed"|"speed"|"balance"|"quality"|"moonlight")

11. Shutter time in highspeed exposure mode (in milliseconds):
    http://camera_ip/get<channel>?shortexposures
    http://camera_ip/set<channel>?shortexposures=(1..10)

12. Auto exposure control:
    http://camera_ip/get<channel>?autoexp
    http://camera_ip/set<channel>?autoexp=("on"|"off")

13. Auto exposure mode:
    http://camera_ip/get<channel>?exposure
    http://camera_ip/set<channel>?exposure=("auto"|"on"|"off")

14. Exposure window:
    http://camera_ip/get?expwndleft
    http://camera_ip/set?expwndleft=(0..max of the corresponding sensor size)

    http://camera_ip/get?expwndtop
    http://camera_ip/set?expwndtop=(0..max of the corresponding sensor size)

    http://camera_ip/get?expwndwidth
    http://camera_ip/set?expwndwidth=(0..max of the corresponding sensor size)

    http://camera_ip/get?expwndheight
    http://camera_ip/set?expwndheight=(0..max of the corresponding sensor size)

15. Sensor cropping:
    http://camera_ip/get?sensorleft
    http://camera_ip/set?sensorleft=(0..max of the corresponding sensor size)

    http://camera_ip/get?sensortop
    http://camera_ip/set?sensortop=(0..max of the corresponding sensor size)

    http://camera_ip/get?sensorwidth
    http://camera_ip/set?sensorwidth=(0..max of the corresponding sensor size)

http://camera_ip/get??sensorheight
http://camera_ip/set?sensorheight=(0..max of the corresponding sensor size)

16. Image settings used as the implicit parameter list in **img.jpg** image requests:
    http://camera_ip/get?imgleft
    http://camera_ip/set?imgleft=(0..max of the corresponding sensor size)

    http://camera_ip/get?imgtop
    http://camera_ip/set?imgtop=(0..max of the corresponding sensor size)

    http://camera_ip/get?imgwidth
    http://camera_ip/set?imgwidth=(0..max of the corresponding sensor size)

    http://camera_ip/get?imgheight
    http://camera_ip/set?imgheight=(0..max of the corresponding sensor size)

    http://camera_ip/get?imgquality
    http://camera_ip/set?imgquality=(0..21)

    http://camera_ip/get?imgres
    http://camera_ip/set?imgres=("full"|"half")

17. Getting MAC number:
    http://camera_ip/get?mac

18. Getting camera model:
    http://camera_ip/get?model

19. Getting firmware version:
    http://camera_ip/get?fwversion

20. Getting image processor engine version:
    http://camera_ip/get?procversion
21. Getting network processor version:
    http://camera_ip/get?netversion

22. Getting PCB revision
    http://camera_ip/get?revision

23. Store current settings into the flash memory:
    http://camera_ip/set?params=save

24. Restore factory default settings:
    http://camera_ip/set?params=factory

25. Custom mode settings:
    http://camera_ip/get<channel>?kneepoint
    http://camera_ip/set<channel>?kneepoint=(1..100)

    http://camera_ip/get<channel>?analoggain
    http://camera_ip/set<channel>?analoggain=(1..10)

    http://camera_ip/get<channel>?maxkneegain
    http://camera_ip/set<channel>?maxkneegain=(2..??)

    http://camera_ip/get<channel>?maxexptime
    http://camera_ip/set<channel>?maxexptime=(0..100)

    http://camera_ip/get<channel>?maxdigitalgain
    http://camera_ip/set<channel>?maxdigitalgain=(32..127)

26. Alternative receiving port of the camera's web server:
    http://camera_ip/get?webserverport
    http://camera_ip/set?webserverport=(0..65535)

27. User password with **admin** level of access:
    http://camera_ip/get?admin
    http://camera_ip/set?admin=(text string of 1..8 ASCII symbols | "empty")
    NOTE: to erase the password use the reserved word "empty".

28. User password with **viewer** level of access:
    http://camera_ip/get?viewer
    http://camera_ip/set?viewer=(text string of 1..8 ASCII symbols | "empty")
    NOTE: to erase the password use the reserved word "empty".

29. Camera's register access:
    http://camera_ip/getreg?page=(0..6)&reg=(0..255)
    http://camera_ip/setreg?page=(0..6)&reg=(0..255)&value=(0..65535)

Access Control

CBC (America) cameras support dual-level password-protected access control. Camera authentication is compatible with RFC-2068 HTTP 1.1 and is supported by all standard browsers and video surveillance software.

There are two types of users with the following reserved names:

admin – has full access to all camera settings and the video.
viewer – has viewing access to all current camera settings and the video.

Setting and removing the passwords is the privilege of the **admin** user, while the **viewer** can only use the existing password, but not change it. Factory defaults erase all current passwords for both the **admin** and the **viewer.** A newly shipped camera has no password protection and allows full anonymous access from the network. In case the **admin** password has not been set, the camera has full anonymous access from the network, even if the **viewer** password has been set.

Access control setup consists of three steps:

1. Set **admin** password (using http commands or using the camera's web page.
2. Log-in using the **admin** password and set the **viewer** password.
3. Convey the **viewer** password to the users.

In order to delete **viewer** password, log-in as **admin** and change the viewer password to a reserved password **empty** – this would restore the full anonymous access to the camera. The **admin** user can change the **viewer** password at any time, even without knowing the current **viewer** password.

NOTE: if the **admin** password has been set and forgotten, it can only be erased through reprogramming the camera's firmware, or by accessing the camera registers via developers' register access from MP100 software.

Motion Detection

On-camera motion detection is currently not available on CBC (America) panoramic cameras. Future releases will have this feature incorporated. Users who have interest in this feature please visit CBC (America) website from time to time for latest updates and/or firmware upgrades.

Chapter 4 Troubleshooting and Useful Tips

Connecting Directly To Laptop or PC

In a typical scenario cameras are connected using network cables to a network switch. A camera can also be connected to a PC or laptop directly. Be sure to use a cross-over network cable between the camera and PC when connecting in this fashion.

When a camera is connected directly, in some cases you may need to change TCP/IP configuration on your PC. For example, configure the PC to work with a static IP address.

When a PoE injector is used and connected directly to a PC there are two networking cables, one cable connects the PC to the PoE injector; the other connects the injector to the camera. Only one of these cables must be cross-over. The other cable must be regular, not cross-over.

Note: MP8D cameras require a higher PoE power class (Class 3: from 6.49 to 12.95 Watt) than other MP camera models.

Switches and Routers

Note that some Gigabit switches and network adapters incompletely emulate 100BaseT signaling levels and may not work correctly with high bandwidth 100BaseT equipment.

Low Sharpness

If the image sharpness appears to be low:

- Check if the lens is in focus.
- Check if the lens is appropriate for a mega-pixel camera.
- Under Image Quality menu decrease compression and increase sharpness.
- Check if the lens iris is fully open or closed down too much. For best resolution and depth of field the iris (depending on lens make and model) should be closed by 2-3 F-stops.

Frequently Asked Questions

1. What type of video compression is used in MP cameras?

MP cameras use MJPEG - Motion JPEG.

2. How much storage space is required when using MP cameras?

The storage space requirements will vary depending on how compressible your imagery will be. Shown below (*Figure 31*) is an example of a system running at 22 FPS. However, the user can specify the archival frequency to be lower than the full frame rate. Most MP cameras also provide highly sophisticated on-board motion detection. To further reduce the required storage the user has an option to archive only those images that contain the motion. Furthermore, MP cameras support real-time resolution changes and image windowing on a frame-by-frame basis. The user may wish to archive windows of interest or reduced resolution images at the high frame rate while archiving full resolution images at the lower frame rate.

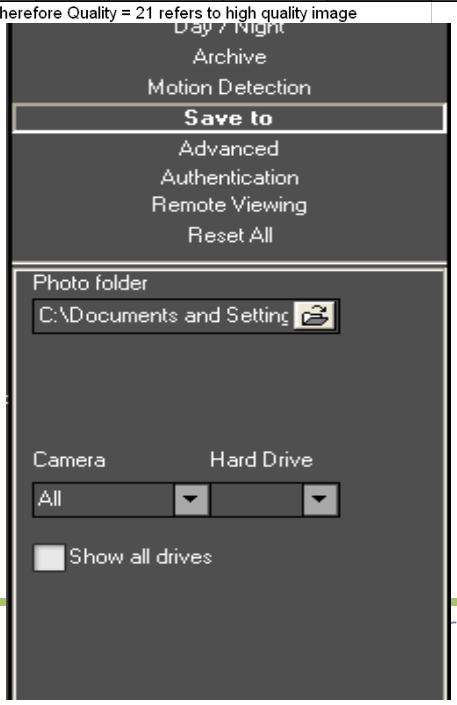
Figure 31. Example of a system running at 22 FPS

Busy scene, lot of motion (e.g. busy parking lot)									
FPS = 22									
	Quality = 2	Storage		Quality = 13	Storage		Quality = 21	Storage	
Resolution	Kbtyes/frame	Mbytes/Hr	Mbytes/24 Hr	Kbtyes/frame	Mbytes/Hr	Mbytes/24 Hr	Kbtyes/frame	Mbytes/Hr	Mbytes/24 Hr
2040x1530	202	15,998	383,962	278	22,018	528,422	463	36,670	880,070
1920x1200	154	12,197	292,723	216	17,107	410,573	352	27,878	669,082
1920x1080	148	11,722	281,318	202	15,998	383,962	329	26,057	625,363
1600x1200	128	10,138	243,302	176	13,939	334,541	293	23,206	556,934
1280x1024	100	7,920	190,080	139	11,009	264,211	227	17,978	431,482
640x480	29	2,297	55,123	40	3,168	76,032	60	4,752	114,048
Quiet scene, not a lot of motion (e.g. hallway)									
	Quality = 2	Storage		Quality = 13	Storage		Quality = 21	Storage	
Resolution	Kbtyes/frame	Mbytes/Hr	Mbytes/24 Hr	Kbtyes/frame	Mbytes/Hr	Mbytes/24 Hr	Kbtyes/frame	Mbytes/Hr	Mbytes/24 Hr
2040x1530	148	11,722	281,318	205	16,236	389,664	369	29,225	701,395
1920x1200	111	8,791	210,989	151	11,959	287,021	267	21,146	507,514
1920x1080	103	8,158	195,782	142	11,246	269,914	247	19,562	469,498
1600x1200	97	7,682	184,378	134	10,613	254,707	233	18,454	442,886
1280x1024	69	5,465	131,155	97	7,682	184,378	165	13,068	313,632
640x480	20	1,584	38,016	26	2,059	49,421	43	3,406	81,734

Notes: Quality refers to JPEG compression. Therefore Quality = 21 refers to high quality image

3. Why am I having trouble running more than one camera?

Our MP100 software implements a licensing policy where one camera will always work, but to have more than one camera displayed you will need a license file. You can obtain a license file by contacting a CBC (America) Rep or contacting CBC (America) Corp.



4. How do I change the location of

the Archive folder?

The default destination of the Archive folder is C:\CBC (America) Storage. The location of the archive can be changed using “Save to” menu under “Settings” (*Figure 32*). While the name of the archival directory should be the same for all cameras, the user has an option of specifying the Hard Drive for the archival on a camera-by-camera basis.

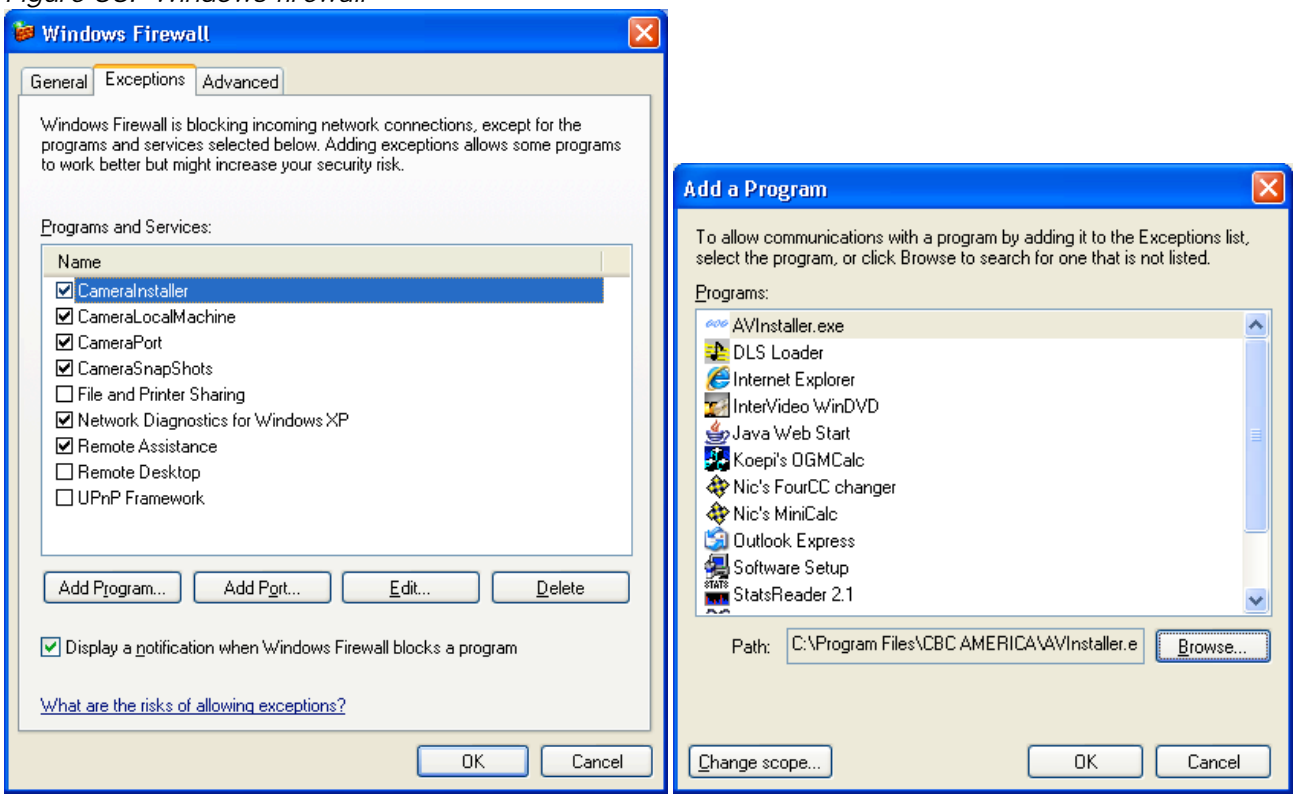
Figure 32. Save to menu

5. Why is my CBC (America) camera not detected by the Camera Installer?

If the camera is not detected it maybe because of the firewall settings. To allow Camera Installer access to the network the user should, configure the firewall properly. To configure the Windows firewall, access the **Windows Security Center** in the Windows **Control Panel**, and then click on **Windows Firewall.**

In the Windows Firewall window (*Figure 33*), click the **Exceptions** tab and add Megapixel Camera programs (CameraInstaller, CameraManager, and CBC Video System) to the list of exceptions. Once the selections have been made click **OK,** and re-run the Camera Installer. If the Camera Installer still can not find the camera make sure that there are no hardware firewalls in the gateways and routers on your network.

Figure 33. Windows firewall



6. Which DVRs support MP cameras?

There are several DVRs that support CBC (America) MP cameras. A few examples are Bosch, March networks, and Sanyo DVRs.

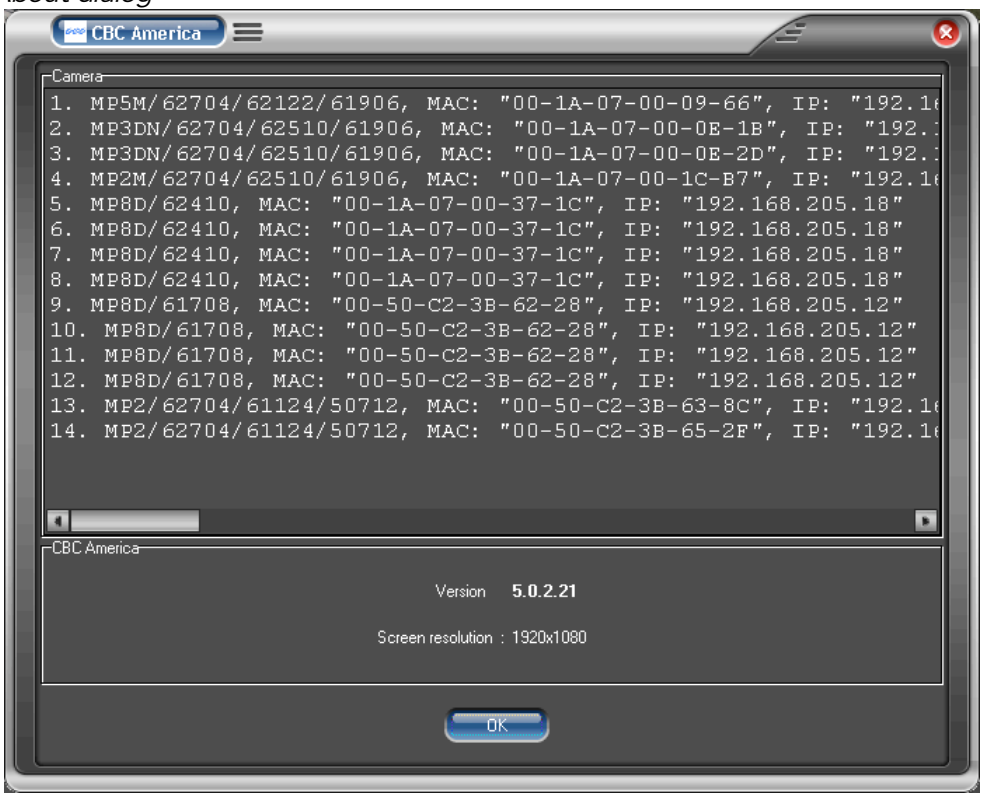
7. **Can I update all my cameras with the same version of firmware?**

   There are three types of updates. One update will update the MP1, MP2, and MP5. The MP3-DN has its own update and it should only be used for the MP3-DN. The MP8D and MP8P have their own update; it should only be used for the MP8D and MP8P. The camera model(s) is listed in the update file name.

8. **How do I find out what version of software is installed and what are the IP and MAC addresses of my cameras?**

This information is displayed in the **About** dialog (*Figure 34*). To open the **About** dialog, right click mouse and select **About**.

Figure 34. About dialog



9. **What is the cost of a CBC (America) camera?**

   The cost varies from camera to camera but for unparallel clarity our prices are unbeatable. Almost all cameras, which includes the basic NVR software, have an MSRP below $1800. Visit us online at http://computarganz.com/o.cfm?o=405 .

10. **Is there third party software that can be used?**

CBC (America) cameras are supported by many third-party software packages, including our own ZNS-NVR software package which can incorporate other IP cameras.
Contact CBC (America) Corp. for an updated list.

Current NVR Partners:
Bosch – www.boschsecurity.com(DiBos 8)
D3DATA – www.d3data.com
DVTEL – www.dvtel.com
Genetec – www.genetec.com
General Electric – www.gesecurity.com
Integral Technologies - www.integral.com
ISN – www.isnsecurity.com
IP Vision Software – www.ipvisionsoftware.com
JDS – www.softsite32.com
LuxRiot – www.luxriot.com
March Networks – www.marchnetworks.com
Milestone – www.milestonesys.com
ONSSI – www.onssi.com
Quadrox – www.quadrox.com
Verint - www.verint.com (Smart Site/NDVR products)

Soon to be NVR Partners:
Tereo – www.tereo.com
Artec – www.artec.de
Geutebruck - www.geutebruck.com
Honeywell – www.Honeywell.com (Fusion products)
JVC – www.jvc.com
TridentTek – www.tridenttek.com

11. When should the user choose auto-iris option?

Many MP cameras support auto-iris option. These cameras are: MP2-A, and MP5-A. Auto-iris option allows keeping the lens optimally closed when there is sufficient scene illumination, providing good depth of focus. When the illumination diminishes the camera opens the lens, allowing more light to reach the sensor, thus extending the sensitivity range of the camera. Auto-iris option should only be used for outdoor applications, where there is a large variation in illumination conditions. In many applications the auto-iris is unnecessary. It is important to keep in mind that the best image

quality will be achieved with megapixel lenses. The auto-iris lenses available on the market today are not megapixel and will yield the images that are less crisp than those that can be obtained with manual megapixel lens.

12. What adjustments can be made to reduce the motion blur?

The shutter speed is automatically controlled by the camera. The motion blur may occur when the camera operates slow shutter speeds (long exposure times). This may happen when the scene is relatively dark. MP cameras provide a number of options that allow the user to control auto-exposure behavior when the illumination is low.

The user can set the preferred exposure time that the camera will attempt to maintain as long as illumination level allows. This setting essentially allows the user to choose the tradeoff between gains and exposure time at reduced light levels. There are 3 basic settings: Speed, Balance, and Quality(*Figure 35*). These settings can be selected from “Low Light Mode” menu Mode list. Speed setting will result in higher image noise but will attempt to maintain 10ms exposure time for as long as possible, reducing motion artifacts. Quality setting will maintain 40 ms exposure time, resulting in low-noise image with some motion blur in low light. Balanced setting is in between.

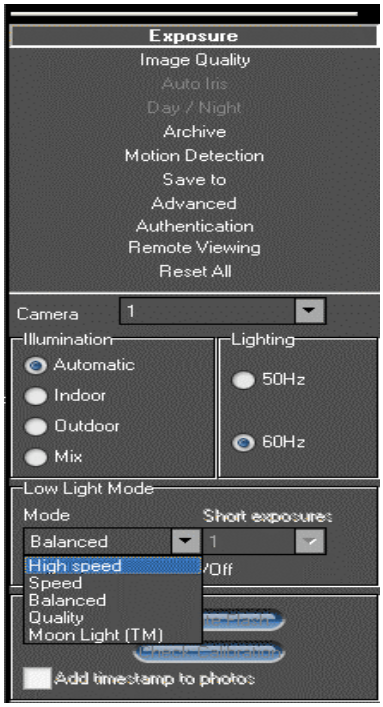
There are also two special modes, High Speed and MoonLight™ that can be used for very fast moving targets and very low illumination, respectively. High Speed mode allows the user to specify fixed exposure time in terms of milliseconds (from 1 to 10). While this will allow crisp video of fast moving vehicles, the side effect of this setting is that low-light performance of the camera will be significantly worse (up to 800 times) than in default mode. Therefore, High Speed should only be used for well lit scenes.

The other special mode, MoonLight™ implements long exposure times (up to 0.5 seconds) in combination with proprietary noise cancellation technology. This mode allows viewing under extremely low illumination conditions. It is important to note, that MoonLight™ is NOT digital frame integration and will offer significantly better image quality than cameras that employ digital frame integration. However, the motion blur will still be significant.

Setting the Low Light Mode to Speed is the first thing to do to eliminate the motion blur. If that doesn't produce enough improvement, the user may want to open the lens aperture more to allow more light in. The user may also want to consider going with the camera equipped with auto-iris lens - the lens will open automatically as illumination diminishes. If that is

not sufficient, the user may want to consider using lower resolution camera. For example, 2-megapixel MP2 has larger pixels and has better low-light sensitivity than the 5-mega pixel product, MP5. If that still does not yield sufficient low-light performance then, the user should consider MP3-DN day-night camera that uses monochrome sensor in low light conditions and is sensitive to 0.01 lux .

Figure 35. Exposure menu



13. What information can I provide to CBCA customer support for a faster response to my issues?

Please provide the lmlog.dat file

- This file can be found at c:\program files\CBC America

Please provide the localmachine.ini file

- This file can be found at c:\program files\CBC America

Computer information

- PC Model number
- 100base-T or Gigabit card
- CPU speed
- Hard disk size, and available free space.

Switch or POE model number.

MP Camera MAC address and firmware release (shown in the About dialog box).

14. How do I disable the auto startup of the CBC America software?

To disable the auto startup of the MP100 Software start from **Settings** Select **Control Panel**, **Administrative Tools,** then double click **Services.** Under **Services (Local)** scroll down and double-click on **LMSrv**. In the LMSrv Properties window select the **General** Tab. Under the **Startup Type:** choose **Disabled.**

15. Is there a link to view live video from your camera systems?

We have three sites that can be accessed. Please contact our sales team at sales@cbcamerica.com.

16. What is the maximum physical distance between a computer and an MP camera?

Typical Ethernet 100Base-T has a maximum distance of 100 meters (330 feet). The range can be increased by using a PoE Ethernet repeater or the standard powered mid-span switch. Alternatively, 3Com IntelliJack Switch that accepts the power over Ethernet can be used to avoid the need to provide mid-span power supply.

17. Are MP cameras RoHS compliant?

CBC (America) products conform to the Europeans Union Restrictions on Use of Hazardous Substances in Electrical and Electronic equipment (RoHS) Directive 2002/95/EC for six regulated substances. The certification is applicable to all CBC (America) products shipped after April 15, 2006.

18. Can we mount a motorized zoom lens from another supplier?

Motorized zoom is not supported by the camera, but you can mount the external PTZ unit with independent controls.

19. How do I access the CBC (America) WEB camera home page to view my cameras remotely.

Simply type in http://200.168.100.10/index.html. Replace bold (200.168.100.10) IP address with actual camera IP address.

20. Is the WEB camera home page compatible with Mozilla Firefox?

You can view photo, video, and adjust the camera setting via the internet using Mozilla Firefox.

21. Does your software include motion detection?

Our software does include motion detection. However, most MP cameras also support on-board motion detection that, in contrast to software motion detection, does not take up CPU cycles. The “on camera” feature was implemented to reduce the overall network bandwidth so the camera itself will not send images until motion is detected. The user can adjust 3 motion detection sensitivity settings and specify up to 64 motion detection zones.

22. Can image archival be configured for cyclic recording?

MP100 software will overwrite old files every few minutes once the available disk space reaches a limit value that the end user can set. By default the value is 15GB but can be changed manually by editing the [storage] field of LocalMachine.ini file located in C:\Program Files\CBC America.

23. Every time that I start the software application it starts recording all frames, even if I set it to record only motion frames. Is this a bug?

This is a bug that was fixed in software version 3.8.1 and above.

24. How can I register with the "Developer Support Portal”?

Access to Developer Support Portal requires an NDA (Non-Disclosure Agreement, to be signed in paper form prior to obtaining access). More information can be provided through sales@cbcamerica.com .

25. How do the CBC (America) cameras utilize PTZ (Pan, Tilt, Zoom)?

There is no mechanical PTZ. However MP cameras have multi-megapixel resolution and allow instantaneous electronic pan, tilt and zoom by specifying PTZ window coordinates. Multiple users can each select their own windows, as though each user independently controls the PTZ.

26. How can I get the MP100 built-in web server to work?

MP100 software has built-in web server that allows multi-user remote access to live video and video archives. This web server can be accessed from IE browser by typing :

HTTP://ip_address:port/guix.htm

where ip_address is the IP addresses of the computer running MP100 and the port corresponds to the port number set in the Remote Viewing menu. Please note that in order to access MP100 server remotely the user should

enable the server by checking the Allow Remote Viewing field and select the port that is not blocked by the firewall. For increased security the default value of remote access port is 4250. The user has the option to select any available port. Often the port 80 (HTTP port) is most likely to be open on the secured network as it is used by default by IE browser.

27. What is the night performance (Lux) of the MP3-DN camera?

In low-light conditions MP3-DN switches to 1.3 megapixel monochrome sensor resulting in good image quality down to 0.01 Lux MP3-DN is also sensitive to near-infrared illumination – allowing the use of standard infrared illuminators as the light source.

28. When I attempt to update the firmware on the MP camera with the firmware update option I receive the "Ack Timeout" message. Why do I get this error?

If you get the timeout message take the following steps:

- Make sure that no application is requesting the images from the camera during the update
- Make sure that the camera is connected via switch and not with direct cross-over cable
- Re-run Camera Installer prior to the upgrade to make sure that the camera is accessible and there is no IP conflict

29. Do the MP cameras support multicast?

No, MP cameras do not support multicast.

30. Are there any moving mechanical parts in the MP3-DN?

The MP3-DN does not have any mechanical moving parts inside.

31. What is Wireshark and where can I get it?

Wireshark is a network protocol analyzer. It can be obtained through their web site at http://www.wireshark.org/

32. What type of power supply is needed for CBC (America) cameras?

MP1, MP2, and MP5 cameras should be powered from a 12V to 48V DC power source providing at least 2.5W per camera. MP3-DN requires 3W. 12V – 1A is recommended. MP8D and MP8P requires 7.8W. Alternatively, all cameras can be powered using POE 802.3af compliant power supply or switch.

33. How do I reset the camera settings to the original factory configuration?

Resetting the MP camera to its original configuration can be achieved through the built-in web server. To reset the MP camera open IE explorer and type as http://ip_address/set?params=factory. Replace ip_address with the actual camera IP address.

Chapter 5. Regulatory Compliance

FCC Compliance Statement

All MP cameras have been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

1. It is suggested that the user use shielded CAT6 cables to comply with FCC rules.
2. It is suggested that the user use power-over-Ethernet supply
3. To comply with FCC rules when using auto-iris with MP1, MP2 and MP5 it is also suggested using a ferrite common mode choke Fair-Rite # 0444164281 with 1 ½ turns place on the auto-iris lens cable three centimeters from the lens.

Terms and Conditions of Sale

1. **Terms and Conditions.** This sale is subject to the terms and conditions set forth below, which supersede any and all terms and conditions set forth in any documents issued by Purchaser, including Purchaser's purchase order. ANY ADDITIONAL, DIFFERENT OR CONFLICTING TERMS AND CONDITIONS HEREBY ARE OBJECTED TO BY CBC (AMERICA), LLC ("CBCA"), AND SHALL BE OF NO FORCE AND EFFECT. No waiver or amendment of these terms and conditions shall be binding on CBCA unless made in writing expressly stating that it is such a waiver or amendment and signed by CBCA.

2. **Limited Warranty.** CBCA warrants to Purchaser (and only Purchaser) (the "Limited Warranty"), that: (a) each Product shall be free from material defects in material and workmanship for a period of twelve (12) months from the date of shipment (the "Warranty Period"); (b) during the Warranty Period, the Products will materially conform with the specification in the applicable documentation; (c) all licensed programs accompanying the Product (the "Licensed Programs") will materially conform with applicable specifications. Notwithstanding the preceding provisions, CBCA shall have no obligation or responsibility with respect to any Product that (i) has been modified or altered without CBCA's written authorization; (ii) has not been used in accordance with applicable documentation; (iii) has been subjected to unusual stress, neglect, misuse, abuse, improper storage, testing or connection; or unauthorized repair; or (iv) is no longer covered under the Warranty Period. CBCA MAKE NO WARRANTIES OR CONDITIONS, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, OTHER THAN THE EXPRESS LIMITED WARRANTIES MADE BY CBCA ABOVE, AND CBCA HEREBY SPECIFICALLY DISCLAIMS ALL OTHER EXPRESS, STATUTORY AND IMPLIED WARRANTIES AND CONDITIONS, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT AND THE IMPLIED CONDITION OF SATISFACTORY QUALITY. ALL LICENSED PROGRAMS ARE LICENSED ON AN "AS IS" BASIS WITHOUT WARRANTY. CBCA DOES NOT WARRANT THAT (I) THE OPERATION OF THE PRODUCTS OR PARTS WILL BE UNINTERRUPTED OR ERROR FREE; (II) THE PRODUCTS OR PARTS AND DOCUMENTATION WILL MEET THE END USERS' REQUIREMENTS; (III) THE PRODUCTS OR PARTS WILL OPERATE IN COMBINATIONS AND CONFIGURATIONS SELECTED BY THE END USER; OTHER THAN COMBINATIONS AND CONFIGURATIONS WITH PARTS OR OTHER PRODUCTS AUTHORIZED BY CBCA OR (IV) THAT ALL LICENSED PROGRAM ERRORS WILL BE CORRECTED.

3. **Exclusive Remedy; Limitation of Liability.** Purchaser's exclusive remedy for a breach of the Limited Warranty shall be limited to repair or replacement of, or refund for, the non-conforming Product (at CBCA's sole option). Product returned to CBCA for non-compliance with this Limited Warranty shall be returned in accordance with the "Rejection/Return" provisions below. Any refund shall be equal to the actual purchase price for the applicable Product. IN NO EVENT SHALL CBCA BE LIABLE TO PURCHASER FOR ANY INDIRECT, INCIDENTAL,

SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM CBCA'S PERFORMANCE OF FAILURE TO PERFORM, WHETHER DUE TO BREACH OF CONTRACT OR WARRANTY, NEGLIGENCE OR OTHERWISE.

4. **Repaired or Replaced Product.** The warranty for repaired or replaced Product shall be limited in scope to the warranty set forth above, and shall have a duration of the greater of (i) the remaining Warranty Period in the original warranty that was applicable to the original Product, extended by the time elapsed between CBCA receiving notice of the non-conformity and Purchaser's receipt of the repaired or replaced Product; or (ii) ninety (90) days following delivery to Purchaser's of the repaired or replaced Product.

5. **Shipment and Risk of Loss.** All Products shipped by CBCA shall be packaged in CBCA's shipping cartons so as to prevent damage and shall be delivered to a common carrier FOB CBCA's facility in Torrance, CA, USA or Commack, NY, USA, at which time risk of loss shall pass to Purchaser. All freight, insurance, and other shipping expenses, as well as expenses for any special packing requested by Purchaser and provided by CBCA, shall be paid by Purchaser.

6. **Licensed Programs.** Upon the sale of any Product to Purchaser, CBCA grants to such Purchaser a non-exclusive, non-transferable, royalty-free license to (i) install copies of the Licensed Programs in appropriate hardware; and (ii) use the Licensed Programs for their intended purpose. Purchaser may make copies of any Licensed Programs only as necessary to exercise its rights authorized hereunder and as necessary to backup the Licensed Programs.

7. **Payment.** Payment shall be in U.S. Dollars, and shall be due and payable in accordance with the terms set forth on the applicable CBCA Quotation. Payment shall be in an amount equal to the purchase price for the applicable Product plus all applicable taxes, shipping charges, and other charges to be borne by Purchaser.

8. **Rejection/Return.** All Products shall be deemed accepted by Purchaser twenty (20) business days after receipt unless Purchaser rejects such Product within such twenty (20) business day period for failure to comply with the Limited Warranty set forth in above. Upon such rejection, Purchaser shall immediately notify CBCA of the rejection and shall, at

CBCA's option, return the Product or allow CBCA to inspect the rejected Product and shall follow CBCA's instructions regarding disposition of the rejected Product. Prior to the return of any Product to CBCA as provided for hereunder, Purchaser shall obtain from CBCA's Technical Support Department a Return Material Authorization ("RMA") number. Within ten (10) business days after receiving an RMA number for the Product, Purchaser shall package the Product in its original packing material or an equivalent and return such Product to CBCA or such other location as CBCA may designate in writing. CBCA shall bear the cost of freight and insurance for the return to CBCA. Purchaser shall enclose with the returned Product the applicable RMA form, and any other documentation or information requested by CBCA. CBCA may refuse to accept returns of any Product not packed and shipped as provided in this paragraph. Upon verification that the Product does not comply with the Limited Warranty, CBCA shall repair, replace, or provide a refund for such Product, at CBCA's option, no later than thirty (30) days after the time CBCA receives from Purchaser written notice of such return or rejection. CBCA shall be responsible for returning, at CBCA's cost, repaired or replaced Products to Purchaser.

9. General Provisions. Notwithstanding any other provision hereof, performance by CBCA shall be excused to the extent that performance is rendered commercially unreasonable by acts of God, war, fire, flood, riot, power failure, embargo, material shortages, strikes, governmental acts, man-made or natural disasters, earthquakes, failure or limitation of supply, or any other reason where failure to perform is beyond the reasonable control and not caused by the negligence of CBCA. The time for performance shall be extended for the time period lost due to the delay. This Agreement shall be governed by and construed under the laws of the State of California, USA, without reference to conflict of laws. These terms and conditions, including those on the face page hereof (if any), set forth the entire agreement and understanding of CBCA and Purchaser with respect to the sale and distribution of Products, the Licensed Products and Parts and supersede all prior or contemporaneous agreements relating thereto, written or oral, between the parties. Purchaser may not assign its rights or delegate its obligations hereunder without the express written consent of CBCA. Any assignment by Purchaser without such consent shall constitute a breach hereof by Purchaser.